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ORIGINAL

A case-control study of endometrial cancer especially with reference to lifestyle and other factors of Japanese women

Sumiyo ASAKURA[1)], Mitsuru MORI[1)], Takahiro SUZUKI[2)] and Tsuyoshi SAITO[2)]

[1)] Department of Public Health, Sapporo Medical University School of Medicine,

[2)] Department of Obstetrics and Gynecology Sapporo Medical University School of Medicine, Sapporo 060-8556, Japan

ABSTRACT

Japanese women's anthropometries and their lifestyles have been gradually changing since 1945. Therefore, we conducted a case-control study in order to explore the relationship of anthropometries, physical activity and other risk factors of endometrial cancer (EC) in Japanese women. This study of EC was conducted between January 2003 and March 2008 in Sapporo, Japan. Informed written consent was obtained from 191 patients and 419 population-based control subjects. The items surveyed were body height and weight, physical activity, past history, family history, menstruation, post-menopausal status, reproductive history, and so on. An adjusted odds ratio (OR) and its 95% confidence interval (95%CI) were estimated with the multivariate unconditional logistic regression model.

The number of pregnancies (Ptrend=0.004) and number of live-births (Ptrend<0.001) were significantly associated with EC risk. Oral contraceptive use was not significantly associated with reduced EC risk when age, area, BMI and number of live-births were adjusted. Adult obesity significantly increased the risk of EC. In addition, the amount of maximum weight gained since the age of 20 years old was strongly related to an increase of EC risk (Ptrend<0.001). When, age, area, BMI, and the number of live-births were adjusted, the duration of physical activity at a certain time was marginally associated with reduced risk of EC (Ptrend=0.050). Light-moderate alcohol consumption (0.1~59.9g per opportunity) was significantly related to the decreased risk of EC even after age, area, BMI and number of live-births were adjusted (P<0.05). We conclude that further study is necessary to clarify the relationship between physical activity and light-moderate alcohol consumption with the reduced risk of EC.

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Key words: Endometrial Cancer, Case-control studies, Risk factor, Obesity, Physical activity

1　INTRODUCTION

Endometrial cancer (EC) is the most prevalent gynecological form of cancer and fourth most frequently diagnosed cancer among women in the United States[1)]. The Japanese population as compared to that of the US and EU exhibits a lower rate of EC. However, the age-adjusted incidence rate of cancer of corpus uteri, mostly EC, rose in Japan from 1.8 per 10^5 populations in 1975 to 5.8 per 10^5 populations in 1998[2)]. Although the rate of EC in Japan accounted for only 5% of all uterine cancer cases in 1985 and 20% in 2000, it has been predicted that by 2020 the incidence rate of uterine cancer cases in Japan due to EC will increase to 40% [3)].

Although the age-adjusted incidence of cancer of the corpus uteri during 1993 and 1997 among Japanese in Miyagi, Japan (4.2 per 10^5 populations) was lower than that among Caucasians in Los Angeles, U.S.A. (20.3 per 10^5 populations), the rate among Japanese immigrants in Los Angeles (13.2 per 10^5 populations) was much higher than that among Japanese in Japan[4)]. These figures suggested that an environmental factor may play a role in the etiology of EC.

Many studies have shown that nulliparity has been consistently associated with the risk of EC[5-12)]. The association between obesity and increased EC risk has also been consistently demonstrated[13-19)]. Adult weight gain has been elucidated with relation to increased risk of EC as well[16, 20-23)]. However, the association between lower levels of physical activities and EC risk is still controversial. Some studies found the significant relationship[9, 18, 23-32)], but others did not[33-36)]. To our knowledge, in Japan, only one study reported that frequent physical activity significantly reduces the risk of EC[9)]. However, this study did not adjust for the potential confounding factors such as obesity and parity. Therefore, we conducted a case-control study of EC to assess the

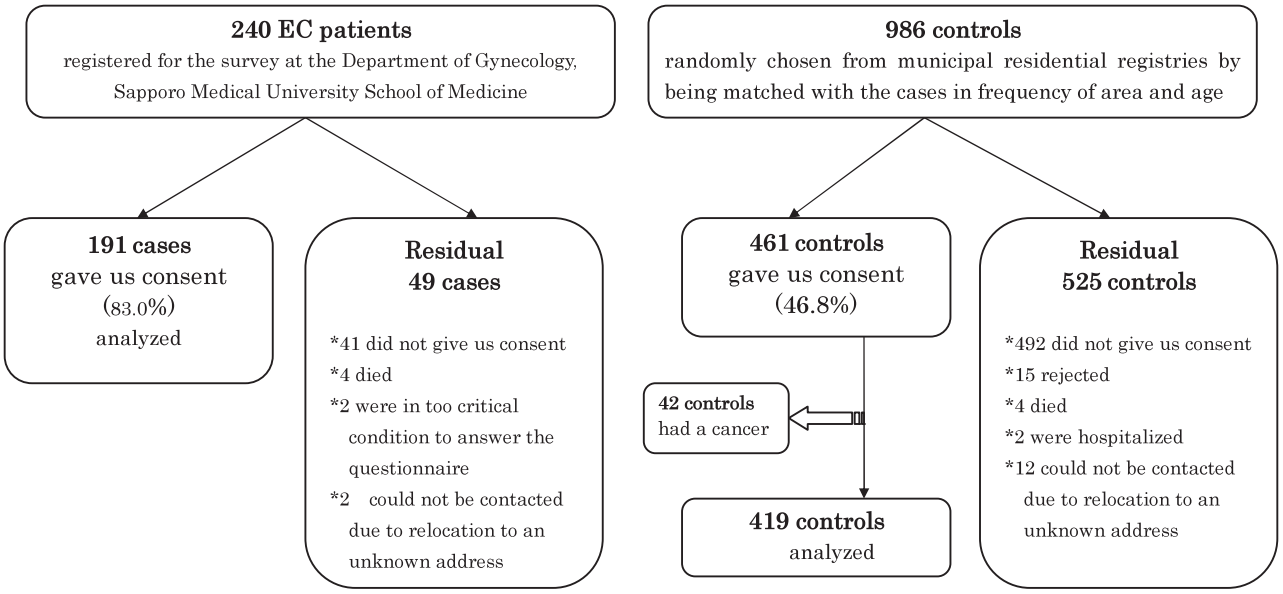

Fig. 1 Flow chart showing the procedure used for selection of the participants in this study.

relationship of physical activity and other factors with EC risk adjusting for potential confounding factors in Hokkaido.

2 SUBJECTS AND METHODS

As shown in Figure 1 cases of histologically confirmed EC were registered for the survey at the Department of Gynecology, Sapporo Medical University School of Medicine, between January 2003 and March 2008. Two hundred forty EC patients were enrolled in the study. Informed written consent was obtained from 191 cases (83.0%) and the survey was completed in January 2008 for every case. Among the residual 49 cases, 41 cases did not give us consent to perform the survey, 4 died, 2 were in too critical condition to answer the questionnaire, and 2 could not be contacted due to relocation to an unknown address. The median interval period between the diagnosis of EC and the survey was 1.5 years (range, 0 ～ 5.2 years).

In total 986 controls, which included about 4 controls per case, were chosen from municipal residential registries by being matched with the cases in frequency of area and age. Written informed consent was obtained from 461 control subjects (46.8%) and the survey was completed in March, 2008 for every subject. Among the residual 525 control subjects, 492 did not give us consent to conduct the survey, 15 rejected, 4 died, 2 were hospitalized, and 12 could not be contacted due to relocation to an unknown address. Exclusion criteria were set up for the control group as "having had any cancer," and 42 controls were excluded as a result of having a cancer. We specifically used 419 controls for the analysis.

The study was approved by the ethics committee of the Sapporo Medical University. A structured and self-administrative questionnaire was sent to the addresses of both the case and control subjects, and they answered every question individually. A trained interviewer asked by telephone if there were questions that were not answered after the completed questionnaire was returned to the Department of Public Health, Sapporo Medical University. Items surveyed were the frequency of consumption of 24 selected foods, cigarette smoking, alcohol consumption, body height and weight, physical activity, past history, family history, menstruation, post-menopausal status, marital status, pregnancy and parity, lactation, contraception, and infertility. Lifestyle habits 1 or 2 years prior to the diagnosis were surveyed for each EC case.

In this article, we focused on variables except for food. An adjusted odds ratio (OR) and its 95% confidence interval (95%CI) were estimated with the multivariate unconditional logistic regression model[37]. The SPSS computer program was employed for the analysis. Both a trend in the OR with exposure (parameter estimates of slope) and an OR by category were calculated with a 95% confidence interval. Average ages (standard deviation, or SD) of the 191 cases and 419 control subjects were 59.2 years (SD=12.5; range 25-89) and 57.4 years (SD=11.9;

range 26-87), respectively.

The distribution of age in cases and controls is shown in Table 1. Addresses of these case and control subjects are located in a total of 14 cities or towns. Variables of age and address (cities or towns) were included in all models for adjustment. Tests of statistical significance were based on two-sided P values, and the α-error was set up at the 5% level or below.

Table 1 Age distribution of the endometrial cancer cases and their controls.

		Cases		Controls	
Items	Contents	Number	%	Number	%
Age	<50 years	47	24.6	118	28.2
	50 ～ 59	63	33	129	30.8
	60 ～ 69	40	20.9	105	25.1
	≧ 70	41	21.5	67	16
Total		191	100%	419	100%

3 RESULTS

As shown in Table 2, there were no differences in age at menarche, age at marriage, age at first pregnancy, age at first delivery and age at menopause between the cases and the controls. As shown in Table 3, when age, area, BMI and number of live-births were adjusted, there were no significant differences between the cases and the controls with regard to marital status and breast-feeding. An increased number of pregnancies (Ptrend=0.002) and an increased number of live-births (Ptrend<0.001) were significantly associated with the decreased risk of EC even if age, area, BMI were adjusted. As shown in Table 4, when age, area, BMI and number of live-births were adjusted, hormone treatment for sterility, hormone replacement therapy and oral contraceptive use were not significantly associated with the risk of EC.

Table 2 Age distribution of various reproductive histories in the endometrial cancer cases and their controls.

	Number	Cases Mean ± SD	Number	Controls Mean ± SD	P-value
Age at menarche	191	13.4 ± 1.6 years	419	13.5 ± 1.7 years	0.435
Age at marriage	167	25.0 ± 4.1 years	380	24.6 ± 3.6 years	0.41
Age at first pregnancy	143	24.8 ± 3.1 years	353	25.2 ± 3.7 years	0.093
Age at first delivery	128	25.5 ± 3.0 years	338	26.0 ± 3.6 years	0.126
Age at menopause	117	50.1 ± 5.2 years	295	49.4 ± 4.9 years	0.307

SD: standard deviation

Table 3 Adjusted odds ratios (ORs)# and their 95% confidence intervals (95%CIs) of endometrial cancer for reproductive history in a case-control study.

		Cases		Controls				
Items	Contents	Number	%	Number	%	OR	95%CI	P value
Marital status	Ever married	168	88.0	380	90.7	1.00		
	Single	23	12.0	39	9.3	1.52	0.85-2.74	P=0.162
Ever pregnant	No	48	25.1	66	15.8	1.00		
	Yes	143	74.9	353	84.2	0.48	0.30-0.75	P=0.002
Number of pregnancies	Never	48	25.1	66	15.8	1.00		
	Once	28	14.7	59	14.1	0.63	0.34-1.15	
	Twice	64	33.5	165	39.4	0.45	0.27-0.75	
	≧ 3 times	51	26.7	129	30.8	0.43	0.25-0.74	
							Trend, P=0.002	
Ever having a live-birth	No	63	33.0	81	19.3	1.00		
	Yes	128	67.0	338	80.7	0.40	0.26-0.61	P<0.001
Number of live-births	Never	63	33.0	81	19.3	1.00		
	Once	24	12.6	66	15.8	0.40	0.22-0.74	
	Twice	75	39.3	205	48.9	0.39	0.25-0.61	
	≧ 3 times	29	15.2	67	16.0	0.44	0.24-0.79	
							Trend, P<0.001	
Ever breast-fed	No	84	44.0	136	32.5	1.00		
	Yes	107	56.0	283	67.5	0.89	0.55-1.43	P=0.625

#: Age, area, and BMI were adjusted.

Table 4 Adjusted odds ratios (ORs)# and their 95% confidence intervals (95%CIs) of endometrial cancer for exogenous hormone exposure in a case-control study.

		Cases		Controls				
Items	Contents	Number	%	Number	%	OR	95%CI	P value
Hormone treatment for sterility	No	178	93.2	403	96.2	1.00		
	Yes	13	6.8	16	3.8	2.10	0.91-4.84	P=0.080
Period of Hormone treatment for sterility	Never	178	93.2	403	96.2	1.00		
	1 ～ 17months	8	4.2	11	2.6	1.94	0.71-5.32	
	18 ～ 35months	2	1.0	4	1.0	1.61	0.26-10.04	
	≧ 36months	3	1.6	1	0.2	4.85	0.45-52.40	
							Trend, P=0.079	
Hormone replacement therapy	No	179	93.7	400	95.5	1.00		
	Yes	12	6.3	19	4.5	1.34	0.62-2.87	P=0.455
Oral contraceptives use	No	180	94.2	372	88.8	1.00		
	Yes	11	5.8	47	11.2	0.51	0.25-1.05	P=0.066
Period of oral contraceptives use	Never	180	94.2	375	89.5	1.00		
	1 ～ 23months	7	3.7	29	6.9	0.60	0.25-1.44	
	≧ 24months	4	2.1	15	3.6	0.47	0.15-1.54	
							Trend, P=0.104	

#: Age, area, BMI and number of live-births were adjusted.

As shown in Table 5, when age, area and number of live-births were adjusted, body height, body weight at age 20 years, BMI at 20 years of age were not significantly associated with risk of EC. Body weight (Ptrend<0.001) was significantly associated with the increased risk of EC when age, area and number of live-births were adjusted. Women in the highest quartile of BMI had a significantly increased risk of EC as compared with those in the lowest quartile category. Similarly, women in the highest quartile of maximum BMI had a significantly increased risk of EC as compared with those in the lowest quartile.

When age, area and number of live-births were adjusted, the maximum body weight gain since 20 years of age was significantly related to an increase of EC risk. Maximum body weight gain of 15kg or more since 20 years of age was significantly associated with the increased risk of EC (OR=3.29; 95% CI 2.00-5.43 Ptrend<0.001). Even if the weight at 20 years of age was also adjusted, maximum body weight gain since 20 years of age was significantly associated with increased risk of EC (Ptrend<0.001), (data not shown in Tables).

As shown in Table 6, the daily walking time and the frequency of physical activity were not associated with EC risk. However, women who engaged in a longer duration of physical activity at a certain time showed a marginally significant decreased risk of EC when age, area, BMI and the number of live-births were adjusted (Ptrend=0.050).

As shown in Table 7, smoking was not associated with risk of EC. However, when age, area, BMI and number of live-births were adjusted, drinking was shown to be significantly associated with reduced risk of EC (P=0.005). The frequency of drinking was significantly related to reduced risk of EC (Ptrend=0.033). Light alcohol consumption (0.1 ～ 29.9g per opportunity) and moderate alcohol consumption (30.0 ～ 59.9g per opportunity) were significantly associated with decreased risk of EC (OR=0.55, 95% CI 0.35-0.88 for light alcohol consumption; OR=0.52, 95% CI 0.30-0.94 for moderate alcohol consumption).

4 DISCUSSION

Several studies have consistently found that women with EC are more likely to be overweight than other women[13-19]. In this study, depending on the measures used to identify excess weight or body mass, the elevation in risk for overweight women relative to women of normal weight was roughly 2-fold. Most studies, including our study (OR=3.29; 95% CI 2.00-5.43 Ptrend<0.001), observed a significant increase in EC risk in weight gained since age 20-25 in multivariable adjusted models[16,20-23], while others did not identify an association between weight gain and EC risk[38].

Several possible biological explanations for these results can be deduced. It is generally accepted that estrogens unopposed by progestogens increase EC risk[39]. Estrogen stimulates proliferation of the endometrium, whereas progestogens stop cell division and stimulate cell differentiation[39]. Obesity increases levels of insulin, and reduces insulin-like growth factors binding protein-1

Table 5 Adjusted odds ratios (ORs)# and their 95% confidence intervals (95%CIs) of endometrial cancer for body statue in a case-control study.

		Cases		Controls			
Items	Contents	Number	%	Number	%	OR	95%CI
Body hight(cm)	<150.0	30	15.7	57	13.6	1.00	
	150.0 ～ 153.9	51	26.7	120	28.6	0.84	0.48-1.48
	154.0 ～ 157.9	50	26.2	104	24.8	1.01	0.57-1.78
	≧ 158.0	60	31.4	138	32.9	0.95	0.54-1.68
							Trend, P=0.874
Body weight at age 20 years(kg)	<45.0	29	15.2	62	14.8	1.00	
	45.0 ～ 49.9	58	30.4	141	33.7	0.88	0.51-1.52
	50.0 ～ 54.9	53	27.7	134	32.0	0.84	0.50-1.46
	≧ 55.0	51	26.7	82	19.6	1.30	0.73-2.30
							Trend, P=0.314
BMI at age 20 years	<19.0	32	16.8	98	23.4	1.00	
	19.0 ～ 20.9	68	35.6	138	32.9	1.42	0.88-2.28
	21.0 ～ 21.9	30	15.7	78	18.6	1.00	0.55-1.83
	≧ 22.0	61	31.9	105	25.1	1.53	0.93-2.51
							Trend, P=0.066
Body weight (kg) prior to diagnosis	<48.0	34	17.8	94	22.4	1.00	
	48.0 ～ 51.9	18	9.4	97	23.2	0.51	0.27-0.96
	52.0 ～ 57.9	56	29.3	113	27.0	1.37	0.82-2.29
	≧ 58.0	83	43.5	115	27.4	1.99	1.22-3.23
							Trend, P<0.001
BMI prior to diagnosis	<20.0	31	16.2	116	25.2	1.00	
	20.0 ～ 21.9	39	20.4	124	26.9	1.24	0.72-2.14
	22.0 ～ 23.9	32	16.8	93	20.2	1.23	0.73-2.32
	≧ 24.0	89	46.6	128	27.8	2.61	1.59-4.29
							Trend, P<0.001
Heaviest non-pregnant body weight	<53.0	32	16.8	108	25.8	1.00	
	53.0 ～ 55.9	22	11.5	85	20.3	0.92	0.49-1.70
	56.0 ～ 61.9	56	29.3	102	24.3	1.88	1.12-3.16
	≧ 62.0	81	42.4	124	29.6	2.15	1.32-3.51
							Trend, P<0.001
BMI at the time of heaviest weight	<22.0	35	18.3	111	26.5	1.00	
	22.0 ～ 23.9	35	18.3	117	27.9	0.99	0.58-1.71
	24.0 ～ 25.9	38	19.9	87	20.8	1.46	0.83-2.54
	≧ 26.0	83	43.5	104	24.8	2.38	1.46-3.87
							Trend, P<0.001
Maximum weight gain since 20 years	<5.0kg	42	22.0	141	33.7	1.00	
	5.0 ～ 9.9kg	53	27.7	128	30.5	1.42	0.88-2.29
	10.0 ～ 14.9kg	35	18.3	88	21.0	1.37	0.81-2.33
	≧ 15.0kg	61	31.9	62	14.8	3.29	2.00-5.43
							Trend,P<0.001

#: Age, area, and number of live-births were adjusted.

(IGFBP-1). Increases in insulin and bioactive insulin-like growth factor-I (IGF-I)[40] which is a polypeptide hormone that stimulates cell proliferation and inhibits cell death in many tissue types, in turn inhibit the hepatic production of sex-hormone-binding globulin (SHBG)[41] and therefore increase levels of plasma estradiol and testosterone unbound to SHBG. Insulin and bioavailable IGF-I may stimulate the gonadal and adrenal synthesis of androgens, which are the direct precursors for estrogen synthesis[42]. Within adipose tissue, androgens are converted into estrogens by the enzyme aromatase; increased adiposity augments total aromatase capacity[43] and increases plasma levels of androgens unbound to SHBG, available for conversion into estrogens.

With greater body mass, especially intra-abdominal fat that may accompany adult weight gain, adipose tissue may become the primary source of estrogen. Additionally, some research observed that reduced adiponectin level

Table 6 Adjusted odds ratios (ORs)# and their 95% confidence intervals (95%CIs) of endometrial cancer for physical activites in a case-control study.

		Cases		Controls			
Items	Contents	Number	%	Number	%	OR	95%CI
Daily walking time	Less than 15 minutes	37	19.4	78	18.6	1.00	
	15 ～ 29 minutes	69	36.1	135	32.2	1.05	0.64-1.73
	30 ～ 59 minutes	48	25.1	116	27.7	0.89	0.53-1.50
	≧ 1 hour	37	19.4	90	21.5	0.91	0.52-1.59
							Trend, P=0.558
Frequency of physical activity	Seldom	28	14.7	50	11.9	1.00	
	Once a week	32	16.8	73	17.4	0.75	0.40-1.41
	2 ～ 3 times per week	43	22.5	81	19.3	0.96	0.52-1.75
	4 ～ 5 times per week	33	17.3	78	18.6	0.74	0.40-1.39
	Everyday	55	28.8	137	32.7	0.75	0.42-1.34
							Trend, P=0.387
Duration of physical activity	Less than 15 minutes	54	28.3	101	24.1	1.00	
	15 ～ 29 minutes	55	28.8	101	24.1	1.04	0.64-1.77
	30 ～ 59 minutes	45	23.6	103	24.6	0.82	0.50-1.35
	≧ 1 hour	37	19.4	114	27.2	0.62	0.37-1.03
							Trend, P=0.050

#:Age, area, BMI and number of live-births were adjusted.

Table 7 Adjusted odds ratios (ORs)# and their 95% confidence intervals (95%CIs) of endometrial cancer for smoking or drinking habits in a case-control study.

		Cases		Controls				
Items	Contents	Number	%	Number	%	OR	95%CI	P value
Experience of smoking habits	No	128	67.0	283	67.5	1.00		
	Yes	63	33.0	136	32.5	1.13	0.77-1.66	P=0.812
Number of cigarette(per day)	None	128	67.0	283	67.5	1.00		
	1 ～ 9	11	5.8	24	5.7	1.24	0.57-2.70	
	10 ～ 19	27	14.1	66	15.8	1.03	0.61-1.75	
	≧ 20	25	13.1	46	11.0	1.30	0.74-2.27	
							Trend, P=0.441	
Experience of drinking habits	No	122	63.9	206	49.2	1.00		
	Yes	69	36.1	213	50.8	0.57	0.40-0.82	P=0.005
Frequency of alcohol drinking	None	122	63.9	206	49.2	1.00		
	1 ～ 3 per month	22	11.5	65	15.5	0.53	0.30-0.94	
	1 ～ 4 per week	23	12.0	82	19.6	0.52	0.30-0.89	
	≧ 5 per week	24	12.6	66	15.8	0.69	0.40-1.20	
	Total						Trend, P=0.033	
Volume of alcohol per opportunity	0.0 g	122	63.9	206	49.2	1.00		
	0.1 ～ 29.9 g	34	17.8	113	27.0	0.55	0.35-0.88	
	30.0 ～ 59.9 g	22	11.5	68	16.2	0.53	0.30-0.94	
	≧ 60.0 g	13	6.8	32	7.6	0.77	0.37-1.59	
							Trend, P=0.039	

#: Age, area, BMI and number of live-births were adjusted.

caused by obesity was found to be independently and inversely associated with EC risk[44, 45]. Adiponectin increases glucose uptake[46], so reduced adiponectin increases insulin level. It is now believed that insulin stimulates the growth of endometrial stromal cells through direct binding to insulin receptors on endometrial cell membranes[47].

In our results, the daily walking time and frequency of physical activity were not associated with EC risk, however women who engaged in a longer duration (360min) of physical activity (including household chores, walking, gardening, and light physical exercise) at a certain time showed a marginally significantly decreased risk of EC when age, area, BMI and number of live-births

were adjusted. The present findings are quite consistent with literature indicating that physical activity is associated with reduced EC risk of about 30-50% when BMI and parity were adjusted[11, 18, 23-27, 29, 30, 32]. Of the nine studies, three studies observed that long duration of physical activity reduced the risk of EC[22-24], and some studies demonstrated risk reductions for light-moderate physical activity, such as household chores, walking, gardening, and light physical exercise[11, 23-26, 30, 32]. Recently, physically active women were reported to have lower levels of endogenous estrogen[48]. Women with high BMI/low physical activity had a mean estrone concentration of 28.8pg/ml, compared with that of high BMI/high physical activity women (24.1pg/ml), low BMI/high physical activity women (19.9pg/ml), and low BMI/low physical activity women (18.4pg/ml)[48].

The biological mechanisms which physical activity influences and the natural history of EC are believed to be related to hormonal and insulin-mediated pathways. Firstly, physical activity may lead to weight reduction, resulting in reduced extragonadal aromatization of the estrogen in adipose tissue, the major source of endogenous estrogen exposure after menopause[43]. Secondly, physical activity, probably in part due to weight loss, has been associated with a decrease in insulin levels[49, 50], and insulin sensitivity[51]. Insulin can stimulate androgen synthesis, decrease levels of SHBG, and increase levels of bioavailable estrogens[40].

Our assessment of physical activity did not distinguish between occupational activities and non-recreational activities such as: household chores, recreational activities, and exercise. Furthermore, our inability to account for the intensity level at which a subject practiced a given activity may have contributed to an error in measurement.

Alcohol has been shown to increase the level of estrogen[52-54], which in turn has been shown to increase EC risk[55] by stimulating the proliferation of endometrial cells[40]. However, in our study, light-moderate drinking was significantly associated with reduced risk of EC. Women who drank a volume of alcohol 0.1～59.9g at once had a decreased risk of EC. This similar finding was reported in several studies[56-59]. Moderate alcohol intake has been shown to improve insulin sensitivity and reduce fasting insulin concentrations[60]. Insulin stimulates the growth of endometrial stromal cells through direct binding to insulin receptors on endometrial cell membranes[47]. This biological mechanism might explain the reduced risk of EC because of light-moderate alcohol consumption.

Our results were consistent with previous observations of a decrease in EC risk with the increasing number of pregnancies or live-births[5-12]. This association has been related to the mechanism involving reduced exposure to estrogens during pregnancy. If pregnancy directly reduces the risk of EC, the decreasing number of pregnancies among Japanese women recently may partly explain the increasing incidence of EC. One study in Japan[61] demonstrated a reduction in the risk of EC associated with breastfeeding, but in our study, after the number of live-births was adjusted, breastfeeding was not associated with EC risk.

In our study, women who had taken oral contraceptive pills (OCPs) did not have a decreased risk of EC. Starting in the mid-1970s, there were reports of endometrial abnormalities[62] and an increased risk of EC among women who used sequential preparations[63], which contained a relatively potent estrogen (ethinyl estradiol) followed by a weak progestogen. Now in contrast, women who have taken combination OCPs had a decreased risk of EC as do nonusers[64, 65]. Some studies reported that OCPs which contain the higher dosages of progestogen have resulted in greater reduction of EC risk[66, 67]. Because only 5.8% of EC cases and 11.2% of the controls reported using OCPs in this study, probably the odds ratio of OCPs did not reach a significant level.

Some large prospective cohort studies[19, 68, 69] reported a significantly reduced risk of EC in current and past smokers. Additionally, a population-based study observed a decreased risk of EC for postmenopausal smokers[70]. It has been hypothesized that smoking might lower the levels of estrogens partly by reducing the amount of fat tissue or by decreasing the age at menopause[71]. However, smoking habits were not related to the risk of EC in our study.

The response rate was not high enough, especially for the control group, and this fact might be a source of selection bias. Women who participated in this study as controls may have tended to practice better lifestyle habits than those who did not participate. In conclusion, weight gain after 20 years of age and the reduced number of parities were associated with an increased risk of EC. On the other hand, physical activity and light-moderate alcohol consumption may be associated with a reduced risk of EC. Further study is needed because of the selection bias in this study.

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Address for correspondence:
Sumiyo ASAKURA
Department of Public Health, Sapporo Medical University School of Medicine, W-17 S-1 Chuou-ku Sapporo Hokkaido 060-8556, Japan.
Fax: +81-11-641-8101
E-mail address: asakuras@sapmed.ac.jp

日本女性における子宮内膜がんと特に関連する生活様式と他の要因についての症例対照研究

朝倉純代[1)]，鈴木孝浩[2)]，齋藤　豪[2)]，森　満[1)]

[1)] 札幌医科大学医学部公衆衛生学教室（主任　森満　教授）

[2)] 札幌医科大学産婦人科

日本人女性の体型および生活習慣などは1945年以降大きな変化を遂げた．そこで我々は，日本人女性における子宮内膜がんの罹患リスクと体型，身体活動などの関連を解明するため，病院ベースの症例対研究を行なった．この研究は，2003年1月から2008年2月まで札幌において行なわれた．患者191人，住民台帳より無作為に選ばれた住民のうち419人より同意が得られ調査を行なった．調査の内容は，身長，体重，身体活動，既往歴，家族歴，初潮年齢，閉経状態，生殖関連要因などである．多変量ロジステック回帰モデル分析によって，年齢や地域などを調整したオッズ比（OR）とその95%信頼区間（95%CI）を推定した．

子宮内膜がんのリスクと，妊娠回数と出産回数は密接に関連していた．経口避妊薬の服用は，地域，年齢，体重，出産数で補正したところ，リスクを下げなかった．大人になってからの肥満は有意にリスクを上げた．更に20歳から現在までの最大体重増加は強くリスクを増加させた．地域，年齢，体重，出産数で調整した後も，長時間の身体活動，少量か中程度のアルコール摂取はリスクを下げていた．この関連を明らかにするために更なる研究が必要である．