

RESEARCH COMMUNICATION

Abortions and Breast Cancer Risk in Premenopausal and Postmenopausal Women in Jiangsu Province of China

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Abstract

To evaluate the relationship between abortions and risk of breast cancer, we conducted a case-control study with 669 cases and 682 population-based controls in Jiangsu Province of China. A structured questionnaire was used to elicit detailed information. Unconditional logistic regression analysis was performed to calculate odds ratios (ORs) and 95% confidence intervals (CIs). The results have revealed that induced abortion was related to increased risk of breast cancer. Premenopausal women who had ≥ 3 times of induced abortion were at increased crude OR (2.41, 95% CI: 1.09-5.42) and adjusted-OR (1.55, 95% CI: 1.15-5.68). Postmenopausal women with a previous induced abortion were at increased crude OR (2.04, 95% CI: 1.48-2.81) and adjusted-OR (1.82, 95% CI: 1.30-2.54), and there was a significant increase trend in OR with number of induced abortions (p for trend: 0.0001). Overall, spontaneous abortion did not significantly alter the risk of breast cancer, but postmenopausal women who had history of spontaneous abortion were at increased OR. These results suggested that relationship between breast cancer and abortions may depend on menopausal status and induced abortion may played an important role in the development of breast cancer in Jiangsu' women of China.

Keywords: Breast cancer - abortion - case control study - Chinese women

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Introduction

Breast cancer constitutes the most common cancer in women and is an important public health concern worldwide. Although the incidence rate of breast cancer in China is much lower than those in Western countries, there has been a marked increase in recent years (Parkin et al., 2005; Yang et al., 2005). Previous studies suggested that physiological and reproductive factors are correlation to risk of breast cancer. Childbearing is acknowledged as protective against breast cancer, but the results of epidemiologic study on breast cancer in relation to abortions are inconsistent (Remennick, 1990; Daling et al., 1994; Brind et al., 1996; Newcomb et al., 1996; Ye et al., 2002; Beral et al., 2004; Palmer, et al., 2004; Brewster et al., 2005; Michels et al., 2007; Naieni et al., 2007; Ozmen et al., 2009). However, induced abortion have been widely used in China, to investigate the potential role of induced and spontaneous abortions as risk factors for the future development of breast cancer in Jiangsu' women of China, we conducted a case-control study.

Materials and Methods

Study Subjects

Breast cancer cases were recruited from data of the

Cancer Registries in Taixing, Wuxi, Jintan and Huian Cities of Jiangsu Province of China, and also from who visited Jiangsu Province Cancer Hospital from these cities from June 2004 to December 2007. All cases were histopathologically diagnosed as having a primary breast cancer. Physicians at the hospital asked eligible cases to participate in this study, and doctors or nurses interviewed the subjects after obtaining informed consent. Population-based controls were selected from healthy residents in eleven villages or towns of Taixing, Wuxi, Jintan and Huian Cities. Doctors of the public health centers randomly selected one or two controls for each case, after matching for ethnicity and age within 2 years using the records of residents at the local governmental office, and then asked eligible residents for their participation. Interviews were performed as far as the cancer cases. Total 669 cases and 682 controls completed interview. A few patients and residents refused to participate in our study, but the response rates were 98% for cases and 99% for controls. The ethics committee of Jiangsu Province Institute of Cancer Research approved this study.

Data collection and Statistical Analysis

A structured questionnaire was used to elicit detailed information on demographic background, socioeconomic status, occupational history, height and weight, menstrual

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Table 1. Induced Abortion and Risk of Breast Cancer

	Cases (%)	Controls (%)	OR ¹ (95%CI)	OR ² (95%CI)
Total				
History of induced abortion				
Never	354 (52.9)	436 (63.9)	1.00	1.00
Have	315 (47.1)	246 (36.1)	1.58 (1.26-1.97)	1.52 (1.21-1.92)
No. of induced abortion				
0	354 (52.9)	436 (63.9)	1.00	1.00
1	156 (23.3)	145 (21.3)	1.33 (1.01-1.74)	1.25 (0.95-1.66)
2	116 (17.3)	81 (11.9)	1.76 (1.27-2.45)	1.67 (1.20-2.32)
≥3	43 (6.4)	20 (2.9)	2.65 (1.48-4.76)	2.50 (1.41-4.42)
P for trend				0.0001
Premenopausal				
History of induced abortion				
Never	145 (46.9)	148 (50.7)	1.00	1.00
Have	164 (53.1)	144 (49.3)	1.16 (0.83-1.62)	1.16 (0.83-1.62)
No. of induced abortion				
0	145 (46.9)	148 (50.7)	1.00	1.00
1	69 (22.3)	82 (28.1)	0.86 (0.57-1.30)	0.86 (0.57-1.30)
2	69 (22.3)	51 (17.5)	1.38 (0.88-2.17)	1.33 (0.84-2.09)
≥3	26 (8.4)	11 (3.8)	2.41 (1.09-5.42)	1.55 (1.15-5.68)
P for trend				0.0212
Postmenopausal				
History of induced abortion				
Never	209 (58.1)	288 (73.8)	1.00	1.00
Have	151 (41.9)	102 (26.2)	2.04 (1.48-2.81)	1.82 (1.30-2.54)
No. of induced abortion				
0	209 (58.1)	288 (73.8)	1.00	1.00
1	87 (24.2)	63 (16.2)	1.90 (1.29-2.80)	1.79 (1.20-2.67)
2	47 (13.1)	30 (7.7)	2.16 (1.29-3.63)	1.85 (1.09-3.13)
≥3	17 (4.7)	9 (2.3)	2.60 (1.07-6.45)	2.14 (0.90-5.08)
P for trend				0.0001

¹Crude OR; ²OR were adjusted for age, marital status, educational level, occupations, body mass index, income/month, age at menarche, age at first birth, numbers of full-term pregnancies and non full-term pregnancies

and reproductive history. All subjects completed an in-person interview. Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated by unconditional logistic regression analysis. We calculated crude ORs and adjusted-ORs for age, marital status, educational level, occupations, body mass index, income/month, age at menarche, age at first birth, numbers of full-term pregnancies and non full-term pregnancies. All the analyses were performed in SAS 8.02 (SAS Institute Inc., Cary, NC). All tests were two-sided, with the significance level of 0.05.

Results

Induced abortion and Breast Cancer Risk

ORs and their 95%CIs on induced abortion and breast cancer risk are shown in Table 1. Compared with women who no history of induced abortion, women with a previous induced abortion had a significant increased risk of breast cancer, the crude and adjusted ORs for breast cancer were 1.58 (95%CI: 1.26-1.97) and 1.52 (95%CI: 1.21-1.92), and there was a significant dose-response relationship between OR for breast cancer and number of induced abortion (p for trend: 0.0001).

Among premenopausal women, the crude and adjusted ORs for breast cancer were not significant different between women with a previous induced abortion and with no history of induced abortion, but larger number of induced abortions were related with increased OR for breast cancer. Women who had ≥3 times of induced abortion were at increased crude OR (2.41, 95%CI: 1.09-

Table 2. Spontaneous Abortion and Risk of Breast Cancer

	Cases (%)	Controls (%)	OR ¹ (95%CI)	OR ² (95%CI)
Total				
History of spontaneous abortion				
Never	559 (83.6)	586 (85.9)	1.00	1.00
Have	110 (16.4)	96 (14.1)	1.20 (0.88-1.63)	1.27 (0.94-1.73)
No. of spontaneous abortion				
0	559 (83.6)	586 (85.9)	1.00	1.00
1	83 (12.4)	69 (10.1)	1.26 (0.89-1.80)	1.36 (0.96-1.93)
≥2	27 (4.0)	27 (4.0)	1.05 (0.59-1.87)	1.08 (0.61-1.90)
P for trend				0.3549
Premenopausal				
History of spontaneous abortion				
Never	275 (89.0)	260 (89.0)	1.00	1.00
Have	34 (11.0)	32 (11.0)	1.00 (0.58-1.73)	0.95 (0.56-1.61)
No. of spontaneous abortion				
0	275 (89.0)	260 (89.0)	1.00	1.00
1	29 (9.4)	22 (7.5)	1.25 (0.67-2.31)	1.22 (0.67-2.21)
≥2	5 (1.6)	10 (3.4)	0.47 (0.14-1.53)	0.40 (0.13-1.23)
P for trend				0.5970
Postmenopausal				
History of spontaneous abortion				
Never	284 (78.9)	326 (83.6)	1.00	1.00
Have	76 (21.1)	64 (16.4)	1.36 (0.93-2.00)	1.54 (1.04-2.28)
No. of spontaneous abortion				
0	284 (78.9)	326 (83.6)	1.00	1.00
1	54 (15.0)	47 (12.1)	1.32 (0.85-2.05)	1.48 (0.95-2.31)
≥2	22 (6.1)	17 (4.4)	1.49 (0.74-2.99)	1.74 (0.86-3.52)
P for trend				0.0988

¹Crude OR; ²OR were adjusted for age, marital status, educational level, occupations, body mass index, income/month, age at menarche, age at first birth, numbers of full-term pregnancies and non full-term pregnancies

5.42) and adjusted-OR (1.55, 95%CI: 1.15-5.68) compared with women who no history of induced abortion. Among postmenopausal women, the crude and adjusted ORs for breast cancer were 2.04 (95%CI: 1.48-2.81) and 1.82 (95%CI: 1.30-2.54) in women with a previous induced abortion compared with women who no history of induced abortion, and there was a significant increase trend in OR with number of induced abortions (p for trend: 0.0001).

Spontaneous abortion and Breast Cancer Risk

As shown in Table 2, there was no significant alteration in risk in relation to history of spontaneous abortion and there were no significant trends in risk with number of spontaneous abortions. But, when the analysis was restricted to postmenopausal women, women who had history of spontaneous abortion were at slightly increased crude OR (1.36, 95%CI: 0.93-2.00) and significantly increased adjusted-OR (1.54, 95%CI: 1.04-2.28), and there was a non-significant increase trend in OR with number of spontaneous abortions (p for trend: 0.0988).

Discussion

An animal study supported that induced abortion might increase the risk of breast cancer (Russo et al., 1980). The full-term pregnancy first causes mammary cell proliferation and then differentiation, thus presumably reducing susceptibility to carcinogenesis. It is speculated that an early interruption of a pregnancy may lead to enhanced proliferation of breast tissue without subsequent differentiation, and hence to increased susceptibility to

carcinogenic change. In this study we found that induced abortion was associated with an increased risk for breast cancer and with a dose-response relationship. The results of our study supported the hypothesis that prior induced abortion represent significant risk factors for later development of breast cancer.

In present study, we also investigate the risk of breast cancer in subgroups of women according to menstrual status. Among premenopausal women, we found that only persons with larger number of induced abortions (≥ 3 times) had a significant increased OR for breast cancer. This result is partly similar to that of other authors (Brewster et al., 2005; Michels et al., 2007). In study of Brewster, the cases were defined as women with new incident breast cancers diagnosed before 55 years of age. Subjects of Michels's study were predominantly premenopausal population. Their results do not support that induced abortion was associated with the incidence of breast cancer, although Michels et al. also found that induced abortion was associated with increased risk of breast cancer among parous women with progesterone receptor negative.

Our study revealed that spontaneous abortion was not associated with risk of breast cancer among premenopausal women whereas there was slightly increased OR for breast cancer among postmenopausal women. Paoletti et al. (2003) found that overall the association between spontaneous abortion and breast cancer was not significant, but there is a suggestion of increased risk with increased number of miscarriages and there is an interaction with menopausal status. They found that the risk for breast cancer decreased with increasing number of spontaneous abortions among premenopause, whereas it increased among postmenopause. Our results are similar to their finds.

Breast cancer is a hormone-related cancer. Chubak et al. (2004) reported that menstrual/reproductive characteristics may be associated with postmenopausal hormone concentrations. They consider that pregnancy may cause an enduring change in a woman's hormone profile (e.g., lowering her estrogen concentrations), and a woman's genetic and environmental profile, or her premenopausal hormone levels may influence both her ability to have children and her postmenopausal sex hormone concentrations. Results of our study support their speculation.

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