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# A Case-Control Study of Parity, Age at First Full-Term Pregnancy, Breast Feeding and Breast Cancer in Taiwanese Women

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**ABSTRACT**

A hospital-based case-control study was designed herein to investigate the relationship between parity, breast feeding and breast cancer in Taiwan. Reproductive histories of patients with breast cancer confirmed by either pathology or cytology were assessed by questionnaire and compared with age-matched healthy controls. One hundred and fourteen cases and 228 age-matched controls were recruited for this study. According to those results, women having had more than three full-term pregnancies, age at first full-term pregnancy younger than 30, and breast feeding for more than 3 years displayed significantly protective effects against breast cancer. Following adjustment for ethnicity and menopausal status, women with more than three full-term pregnancies and younger than 30 years old at first full-term pregnancy had a decreasd risk of breast cancer. However, duration of breast feeding was not related to breast cancer, after adjustment for ethnicity and menopausal status. The effect of number of full-term pregnancies on the risk of breast cancer was found to be independent of the effect of age at first full-term pregnancy. Moreover, the effect of age at first full-term pregnancy and number of full-term pregnancies was also independent of the effect of breast feeding.

**Key Words:** breast cancer; parity; breast feeding; age at first full-term pregnancy.

## I. Introduction

Women in North American and Northern European countries have the highest risk of breast cancer, while women in Southern European and Latin American countries are at intermediate risk; women in African and Asian countries have the lowest risk (Kelsey, 1993; Kelsey *et al.*, 1993; Kelsey and Berkowitz, 1988; Kelsey and Gammon, 1990). However, a rapid increase of incidence rates of breast cancer has been noted in recent years in many Asian, Central European, and some South American countries (Kelsey, 1993; Kelsey *et al.*, 1993; Kelsey and Berkowitz, 1988; Kelsey and Gammon, 1990). In Taiwan, the incidence of breast cancer has recently been increasing, and has become the second most common cancer among females (Chie *et al.*, 1995b; Department of Health, 1985-1994; Lin *et al.*, 1971). The breast cancer incidence rate per 100,000 increased from 5.94 in 1979 to 11.62 in 1986 (Department of Health, 1985-1994). The breast cancer mortality rate per 100,000 women was 3.92 in 1981, and 7.65 in 1993, ranking fifth among causes of female cancer mortality (Chie *et al.*, 1995a; Department

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of Health, 1979-1994).

International and migrant studies suggested that genetic and environmental factors are responsible for the variations in breast cancer incidence among various countries (Kelsey, 1993; Kelsey *et al.*, 1993; Kelsey and Berkowitz, 1988; Kelsey and Gammon, 1990). The risk factors for female breast cancer that are generally established include age, race or ethnicity, socioeconomic status, religion, country of birth, place of residence, marital status, nulliparity, late age at first full-term pregnancy, early age at menarche, late age at menopause, obesity, removal of ovaries before age 40, history of cancer in one breast, mother or sister having a history of breast cancer, history of primary endometrial or ovarian cancer, and radiation to the chest in moderate to high doses. In addition, other risk factors have been identified but still have some contradictory results, i.e. parity, breast feeding, long-term exposure to oral contraceptives, and others (Chie *et al.*, 1996; Kelsey, 1993; Kelsey *et al.*, 1993; Kelsey and Berkowitz, 1988; Kelsey and Gammon, 1990). In this study, we investigate whether if reproductive factors are related to breast cancer in Taiwan.

## II. Materials and Methods

A case-control study was designed to identify the influential factors related to breast cancer in Taiwan. Breast cancer patients were recruited from female patients admitted with breast cancer, confirmed by either pathological biopsy or cytological examination in Tri-Service General Hospital, Taipei, Taiwan. The control group was recruited from females admitted for health examination in the same hospital. The controls were matched to cases by age (±5 years) and the closest admission date with a 2:1 control/case ratio. All participants were interviewed in the hospital with a formatted questionnaire. The variables collected included personal characteristics and habits, marital status and reproductive history, history of breast feeding, history of gynecological diseases, familial history of breast cancer and other cancers, history of hormone replacement therapy, and radiation exposure. One hundred and fourteen breast cancer cases and 228 age-matched controls were recruited for this study.

## III. Statistical Methods

The distribution of characteristics in the study population was expressed as proportions. Chisquare test was used to compare the difference of distribution between cases and controls. Conditional logistic regression was used to calculate the matched odds ratio and 95% confidence interval (CI) for a single variable or adjusted for other variables. Ordinal scales were used in the conditional logistic regression model to evaluate the doseresponse relationship. A value of $p < 0.05$ was considered significant.

## IV. Results

### 1. Distribution of Characteristics among Cases and Controls

Table 1 summarized the distribution of personal characteristics and habits among cases and controls. The distribution of age, marital status, years of education, smoking status, athletic history in school, and the mean age were not significantly different between case and control groups. However, the distribution of ethnicity was significantly different between these two groups. The proportion of patients of Mainland Chinese descent was higher in the case group, while the proportion of Fukien-Taiwanese was higher in the control group. The difference in the distribution of menopausal status between case and

**Table 1.** Distribution of Characteristics among Study Subjects

| | Case (h = 114) | Control (h = 228) | p[a] |
|---|---|---|---|
| Age | 49.68 ± 10.95 | 50.07 ± 10.67 | 0.75[c] |
| Ethnicity | | | |
| Mainlander | 48 (42.1)[b] | 68 (30.0) | 0.02 |
| Others | 66 (57.9) | 160 (70.2) | |
| Marital status | | | |
| Never | 9 (7.9) | 10 (4.4) | 0.28 |
| Married | 93 (81.6) | 192 (84.6) | |
| Divorced | 1 (0.9) | 9 (4.0) | |
| Widowed | 11 (9.6) | 16 (7.1) | |
| Education (yr) | | | |
| ≤ 12 | 78 (68.4) | 164 (71.9) | 0.50 |
| > 12 | 36 (31.6) | 64 (28.1) | |
| Premenopause | | | |
| Yes | 66 (57.9) | 110 (48.2) | 0.09 |
| No | 48 (42.1) | 118 (51.8) | |
| Smoking status | | | |
| Smoker | 5 (4.4) | 18 (7.9) | 0.34 |
| Ex-smoker | 3 (2.6) | 3 (1.3) | |
| Non-smoker | 106 (93.0) | 207 (90.8) | |
| Have been an athlete | | | |
| Yes | 7 (6.1) | 17 (7.5) | 0.65 |
| No | 107 (93.9) | 211 (92.5) | |

[a] by Chi-square test
[b] Number of subjects (%)
[c] Student's *t*-test

control groups was borderline-significant. The proportion of premenopausal subjects was higher in the case group (57.9%) than in the control group (48.2%).

Table 2 lists the distribution of gynecological disease history, familial history of cancers and X-ray exposure history among cases and controls. The history of tubal ligation, hysterectomy, oophorectomy and breast implants was not significantly different between the case and control groups. The history of using oral contraceptives and spontaneous or artificial abortion was also not markedly different between the two groups. Since the control group had a higher proportion of postmenopausal status, the history of using hormones for postmenopausal syndrome or hormone replacement therapy was significantly higher in the control group than in the case group. The proportions of regular Papnicolou smear examination and using intrauterine devices were also higher in the control group than in the case group.

A small number of the study population had familial history of cancer. Only three cases and one control had a history of breast cancer in their mothers. None of the study population had a history of breast cancer in their sisters. The mother of one control subject had endometrial cancer, and the mothers of three control subjects had ovarian cancer. None of the study population had a history of ovarian or endometrial cancers in themselves or their families. One case had suffered from lung cancer for five years. The history of upper gastrointestinal and head or neck X-ray examination was rare in both cases and controls. The history of chest X-ray exposure was not significantly different between the case and control groups. Only one case and one control had a history of breast implantation.

**Table 2.** Distribution of Gynecological Diseases, Familial History of Cancer and X-ray Exposure Among Study Subjects

| | Case (N = 114) | Control (N = 228) | P[a] |
|---|---|---|---|
| Current or previous use of oral contraceptives | | | |
| Yes | 24 (21.1)[b] | 57 (25.1) | 0.41 |
| No | 90 (78.9) | 170 (74.9) | |
| Previous use of other hormone | | | |
| Estrogen replacement | 2 (1.8) | 9 (4.0) | 0.02 |
| Postmenopausal syndrome | 2 (1.8) | 21 (9.3) | |
| No | 110 (96.5) | 197 (86.8) | |
| Regular Pap. smear exam. | | | |
| Yes | 64 (56.1) | 155 (68.0) | 0.03 |
| No | 50 (43.9) | 73 (32.0) | |
| Current or previous use of IUD | | | |
| Yes | 45 (39.5) | 114 (50.0) | 0.07 |
| No | 69 (60.5) | 114 (50.0) | |
| Oophorectomy | | | |
| Total | 4 (3.5) | 8 (3.5) | 0.24 |
| Partial | 2 (2.6) | 16 (7.0) | |
| Never | 107 (93.9) | 203 (89.6) | |
| Breast implants | | | |
| Yes | 1 (0.9) | 1 (0.4) | 0.62 |
| No | 113 (99.1) | 227 (99.6) | |
| Mother having bilateral breast cancer | | | |
| Yes | 1 (0.9) | 0 (0) | 0.16 |
| No | 113 (99.1) | 228 (0) | |
| Mother having unilateral breast cancer | | | |
| Yes | 2 (1.8) | 1 (0.4) | 0.22 |
| No | 112 (98.2) | 227 (99.6) | |
| Mother having ovarian of endometrial cancer | | | |
| Yes | 0 (0) | 4 (1.7) | 0.15 |
| No | 114 (100) | 224 (98.3) | |

[a] by Chi-square test
[b] Number of subjects (%)

## 2. Single Variable Analysis of Influential Factors

Single variables were analyzed by conditional logistic regression to calculate the matched odds ratio of breast cancer risk with 95% confidence interval. Table 3 lists the influential factors identified in this study. Mainland Chinese subjects had a significantly higher risk of breast cancer than subjects of other ethnic groups ($p < 0.05$). Breast cancer was related to higher age at menopause (> 50 years), but the significance level was borderline ($p = 0.06$). Premenopausal women had a significantly higher risk than women who were more than 50 years old at menopause ($p < 0.05$). An increasing trend of breast cancer risk was noted with increasing age at menopause (OR = 1.73, $p = 0.005$ for test of trend). Age at menarche of less than 15 years was related to a significantly higher risk of breast cancer than menarche at ages of 15 years or older ($p < 0.05$).

Marriage at 30 years or older was associated with a significantly higher risk than at younger than 30 years ($p < 0.05$). However, risk of breast cancer in those having never married was not significantly higher than in those married at younger than 30 years old. A significant trend of increasing risk of breast cancer with increasing age at marriage was found (OR = 1.74, $p = 0.03$). Age at the first full-term pregnancy older than 30 years was related to significantly higher risk than age younger than 30 years (OR = 2.47, $p < 0.05$). However, nulliparous women did not have a significantly higher risk than women whose age at the first fullterm pregnancy was less than 30 years.

**Table 3.** Matched Odds Ratio of Breast Cancer Associated with Reproductive Factors

| | Case (n) | Control (n) | OR[a] | 95% CI[b] | OR[c] | 95% CI[b] |
|---|---|---|---|---|---|---|
| Ethnicity | | | | | | |
| Mainlander | 48 | 68 | 1.00 | — | | |
| Other | 66 | 160 | 1.81** | 1.10-2.99 | — | |
| Age at menopause | | | | | | |
| ≤ 50 | 24 | 77 | 1.00 | — | | |
| > 50 | 24 | 39 | 1.95* | 0.96-3.94 | — | |
| Premenopause | 66 | 112 | 3.15**,*** | 1.42-7.01 | | |
| Age at menarche[d] | | | | | | |
| > 15 | 19 | 59 | 1.00 | — | 1.00 | — |
| ≤ 15 | 92 | 161 | 1.84** | 1.01-3.34 | 1.63 | 0.88-3.02 |
| Age at the first full-term pregnancy | | | | | | |
| ≤ 30 | 88 | 200 | 1.00 | — | 1.00 | — |
| Nulliparous | 13 | 19 | 1.69 | 0.85-4.52 | 1.38* | 0.92-2.06 |
| > 30 | 13 | 9 | 2.47**,*** | 1.05-5.82 | 2.01**,*** | 1.04-3.89 |
| No. of full-term pregnancy | | | | | | |
| > 3 | 28 | 86 | 1.00 | — | 1.00 | — |
| 1-3 | 73 | 123 | 2.35** | 1.27-4.34 | 2.05** | 1.09-3.85 |
| 0 | 13 | 19 | 2.86**,*** | 1.11-7.34 | 2.35*** | 0.89-6.20 |
| Total years of breast feeding | | | | | | |
| > 3 | 44 | 60 | 1.00 | — | 1.00 | — |
| ≤ 3 | 46 | 104 | 1.28 | 0.69-2.38 | 1.19 | 0.63-2.24 |
| 0 | 24 | 64 | 2.39**,*** | 1.19-4.81 | 1.95* | 0.96-3.98 |

[a] OR = crude odds ratio, by conditional logistic regression
[b] CI = confidence interval
[c] OR = odds ratio, by conditional logistic regression adjusted for menopausal status and ethnicity
[d] Three cases were missing
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.05$, test for trend

The increasing risk of breast cancer with increasing age at the first full-term pregnancy was also significant (OR = 1.75, p = 0.007).

The number of full-term pregnancies and breast feeding was found to be related to breast cancer. When compared to women having more than three full-term pregnancies, women with one to three full-term pregnancies had a significantly higher risk of breast cancer ($p < 0.05$). Nulliparous women also had a significantly higher risk than women having more than three full-term pregnancies ($p < 0.05$). An increasing trend of breast cancer risk was found to be significantly associated with a decreasing number of full-term pregnancies (OR = 1.85, p = 0.007). Women in this study who had breast fed less than 3 years also had a higher risk of breast cancer than those who had breast fed 3 years or more; however, the difference was not significant ($p > 0.05$). Women without a history of breast feeding had significantly a higher risk of breast cancer than women who breast fed more than 3 years ($p < 0.05$). A significantly increasing trend of breast cancer risk with decreasing years of breast feeding was also noted (OR = 1.56, p = 0.01).

Marital status, smoking status, total years of menstruation cycle, and the number of spontaneous or artificial abortions were not found to be related to an increased risk of breast cancer.

## 3. Adjusted Odds Ratio for Risk Factors

Since ethnicity and menopausal status were found to be associated risk factors of breast cancer and the distribution of ethnicity and menopausal status were different between the case and control groups, ethnicity and menopausal status was adjusted by conditional logistic regression to obtain adjusted odds ratio for other risk variables. Table 3 lists the adjusted odds ratio and 95% confidence interval. After adjustment for ethnicity and menopausal status, age at menarche and age at marriage were not found to be significantly related to breast cancer. However, age at the first full-term pregnancy and the number of full-term pregnancies were still significantly related to breast cancer. The cumulative

years of breast feeding were only borderline significant.

Age at the first full-term pregnancy over 30 years was associated with significantly higher risk of breast cancer than age younger than 30 years (OR = 2.01, 95% CI = 1.04-3.89), after adjusted for ethnicity and menopausal status. However, nullipatous women had a borderline higher risk than those with first full-term pregnancy at younger than 30 years (OR = 1.38, 95% CI = 0.92-2.06). A significant increasing risk of breast cancer was found with age at the first full-term pregnancy. The risk was lowest in women with age at the first full-term pregnancy younger than 30 years, followed by nulliparous and age at the first full-term pregnancy over 30 years. Women with one to three full-term pregnancies had a significantly higher risk of breast cancer than women with more than three full-term pregnancies (OR = 2.05, 95% CI = 1.09-3.85), after adjusting for ethnicity and menopausal status. Nulliparous women had a higher risk of breast cancer than women with more than three full-term pregnancies (OR = 2.35, 95% CI = 0.89-6.20); however, the difference was not significant. An increasing risk apparently occurred with a decreasing number of full-term pregnancies (OR = 1.64, p = 0.03), after adjusted for ethnicity and menopausal status.

Women without a history of breast feeding and women with history of breast feeding less than 3 years had a higher risk of breast cancer, after adjusting for ethnicity and menopausal status, although the difference was not significant. Although neither difference was statistically significant, an increasing trend apparently occurred with decreasing years of breast feeding (OR = 1.41, p = 0.06).

### 4. Adjusted Odds Ratio for Parity and Breast Feeding

To evaluate whether the effect of parity was independent of age at first full-term pregnancy, the two variables were put in the regression model to adjust for each other (Table 4, model 1). According to these results, the effect of parity was independent of age at first full-term pregnancy. After adjusting for age at the first full-term pregnancy, a significant relation was still found for those having one to three full-term pregnancies, but not for those who were nulliparous. Those who were over 30 years of age at first full-term pregnancy also had a significantly higher risk of develop-ing breast cancer than those at younger than 30 years or nulliparous (OR = 2.75, 95% CI = 1.09-6.03).

To evaluate whether the effect of breast feeding was indepensent of age at first full-term pregnancy and parity, these variables were put in the gregression model to adjust for each other variable (Table 4, model 2). Adjusted for parity and age at the first full-term pregnancy, duration of breast feeding was not found to be related to breast cancer. The effect of parity and age at the first full-term pregnancy was independent of breast feeding.

**Table 4.** Adjusted Odds Ratio of Parity and Breast Feeding for Risk of Breast Cancer

| | Model 1[a] | Model 2[a] |
|---|---|---|
| Age at the first full-term pregnancy | | |
| ≤ 30 | 1.00 | 1.00 |
| > 30 | 2.57 (1.09-6.03)[b]** | 2.33 (0.98-5.54)* |
| Number of full-term pregnancy | | |
| > 3 | 1.00 | 1.00 |
| 1-3 | 2.24 (1.20-4.18)** | 2.06 (1.03-4.12)** |
| 0 | 1.19 (0.36-3.89) | 0.94 (0.26-3.45) |
| Total years of breast feeding | | |
| > 3 | | 1.00 |
| ≤ 3 | | 0.96 (0.48-1.90) |
| 0 | | 1.52 (0.66-3.49) |

[a] by conditional logistic regression adjusted for menopausal status and ethnicity
[b] odds ratio (95% confidence interal)
*p < 0.10, **P < 0.05

## IV. Discussion

This case-control study reveals that women with early age at menarche, late age at menopause, late age at marriage, late age at the first full-term pregnancy, three or fewer full-term pregnancies or nulliparity, and without history of breast feeding have a significantly increased risk of breast cancer. However, marital status, smoking status, total years of menstruation cycle, and the number of spontaneous or artificial abortions are not found to be related to an increased risk of breast cancer. Early age at menarche, late age at menopause, and late age at the first full-term pregnancy have been confirmed for many years to be associated with an increased risk of breast cancer (Kelsey, 1993; Kelsey *et al.*, 1993; Kelsey and Berkowitz, 1988; Kelsey and Gammon, 1990). Our results correspond to previous studies. In addition, this study also indicates that women who gave birth to their first child after age 30 have a higher risk than not only women who gave birth before age 30, but also than nulliparous women (OR = 1.79, 95% CI = 0.60-5.35) (Negri *et al.*, 1988; Layde *et al.*, 1989; Brinton *et al.*, 1983).

However, the relation between breast cancer risk and multiparity and breast feeding still remains uncertain. Previous evidence suggests no independent effect of multiparity (MacMahon *et al.*, 1970). However, more recent studies indicate that multiparity has an independent effect (Negri *et al.*, 1988; Layde *et al.*, 1989; Yuan *et al.*, 1988; Wang *et al.*, 1992; Kvale *et al.*, 1987). This study reveals that the risk of breast cancer in women with one to three full-term pregnancies and nulliparous women have a significantly higher risk than women with more than three full-term pregnancies, even after adjusting for ethnicity and menopausal status. The increasing risk of a decreasing number of full-term pregnancies is also significant after adjusting for ethnicity and menopausal status. Those results suggest that multiparity does have an inhibitory effect against breast cancer. The risk of breast cancer in women with one to three full-term pregnancies is significantly higher than in women with more than three full-term pregnancies, affer adjusting for age at the first birth. This finding implies that multiparity may have an independent effect on breast cancer.

Current evidence for an inhibitory effect of breast feeding in the United States remains inconclusive (Kelsey, 1993; Kelsey *et al.*, 1993; Kelsey and Berkowitz, 1988; Kelsey and Gammon, 1990); several years of breast feeding appears to be protective (Chie *et al.*, 1996; Yuan *et al.*, 1988; Wang *et al.*, 1992; Tao *et al.*, 1988). The proportion of breast feeding in Taiwanese women was 93% in 1968 and 50% in 1980 (Notzon, 1984). The average duration of breast feeding was 13.6 months in 1968 and was 4.4 months in 1980. The proportion of breast feeding in this study was 78% (164/209) in delivered women of the control group. This proportion is quite close to the average of those two periods, which may represent the proportion of breast feeding during their reproductive age. Therefore, the control group may be representative with regard to frequency of breast feeding. In the control group, 28.7% (60/228) of the women breast fed more than 3 years. Although the proportion of breast feeding for more than 3 years in this study was not as high as the 50% reported in China (Yuan *et al.*, 1988; Wang *et al.*, 1992; Tao *et al.*, 1988), an inhibitory effect was found for women with breast feeding for more than 3 years. The risk in women without a history of breast feeding was significantly higher than in those having breast fed more than 3 years. However, the risk of breast cancer in women without history of breast feeding when compared to those with breast feeding for more than 3 years, and the increasing risk with decreasing duration of breast feeding was only borderline significant, after adjusting for ethnicity and menopausal status. This finding suggests a weak protective effect of breast feeding. In addition, after adjusting for age at the first full-term pregnancy and parity, no trend of decreasing risk was found with an increasing duration of breast feeding. This result suggests that breast feeding may not have an independent effect on breast cancer.

Since the risk factors related to breast cancer were different between premenopausal and postmenopausal women (Kelsey, 1993; Kelsey *et al.*, 1993; Kelsey and Berkowitz, 1988; Kelsey and Gammon, 1990; De Warrd *et al.*, 1974; Paffenbarger *et al.*, 1980; Pathak and Whittemore, 1992; Folson *et al.*, 1990; Trichopoulos *et al.*, 1972), stratified analysis was performed to adjust for menopausal status. Most breast cancer patients in this study were in the premenopausal status (57.9%). This phenomenon may reflect an increasing incidence rate of breast cancer in premenopausal women in Taiwan (Department of Health, 1985-1994). Another factor may be a selection bias. Most patients admitted may be highly selective for being young enough for treatment. Most older women in Taiwan do not have periodical breast examinations, possibly owing to a feeling of personal shame. Also, breast cancer in aged women is usually found to be too advanced to be properly treated. The youngest breast cancer patient in this study was only 27 years old. Through health education for early detection of breast cancer and progression in the method of diagnosis, the mean age of incident breast cancer cases has been recently decreasing in Taiwan (Department of Health, 1985-1994).

The incidence of breast cancer is increasing in Taiwan and some other Asian countries. Knowledge of risk factors related to increased risk of breast cancer is an important means of combatting this trend. Age at the first full-term pregnancy of 30 years or older was significantly associated with increased risk of breast cancer. This risk factor may be important in the prevention of breast cancer in Taiwan. Recently, more women in Taiwan marry beyond the age of 30, as in Western countries. Two full-term pregnancies were a policy of family planning in Taiwan between the 1960s and 1980s. Formula feeding has also become popular in Taiwan, as in many industrialized societies. Such factors facilitate the increasing incidence rate of breast cancer in Taiwan. Reducing the risk factors by education may combat the increasing tend of breast cancer in Taiwan.

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## References


Brinton, L.A., Hoover, R. and Fraumeni, J.F., Jr. (1983) Reproductive factors in the etiology of breast cancer. *Br J Cancer*, **47:**757-762.

Chie, W.C., Chen, C.F., Lee, W.C., Chen, C.J. and Lin, R.S. (1995a) Age-period-cohort analysis of breast cancer mortality. *Anticancer Research,* **15:**511-516.

Chie, W.C., Chen, C.F., Chen, C.J., Chang, C.L., Liaw, Y.P and Lin, R.S. (1995b) Geographic variation of breast cancer in Taiwan: International and migrant comparison. *Anticancer Research*, **15:**2745-2750.

Chie, W.C., Chen, C.F., Lee, W.C. and Chen, C.J. (1996) Socioeconomic status, lactation and breast cancer risk of parous women in Taiwan. *Oncology Reports*, **3:**497-501.

Department of Health (1979-1994) *Health and Vital Statistics, Republic of China.* The Executive Yuan, R.O.C.

Department of Health (1985-1994) *Cancer Registry Annual Report in Taiwan Area.* The Executive Yuan, R.O.C.

De, W.F. and Baanders-van Halewiin, E.A. (1974) A prospective study in general practice on breast cancer risk in postmenopausal women. *Int J Cancer*, **14:**153-160.

Folsom, A.R., Kaye, S.A., Prineas, R.T. *et al.* (1990) Increased incidence of carcinoma of the breast associated with abdominal adiposity in postmenopausal women. *Am J Epidemiol*, **131:**794-803.

Kelsey, J.L. (1993) Breast cancer epidemiology: Summary and future directions. *Epidemiol Review*, **15:**256-263.

Kelsey, J.L. and Berkowitz, G.S. (1988) Breast cancer epidemiology. *Cancer Research*, **48:**5615-5623

Kelsey, J.L. and Gammon, M.D. (1990) Epidemiology of breast cancer. *Epidemiol Review*, **12:**228-240.

Kelsey, J.L., Gammon, M.D. and John, E.M. (1993) Reproductive factors and breast cancer. *Epidemiol Review*, **15:**36-47.

Kvale, G., Heuch, I. and Eide, G.E. (1987) A prospective study of reproductive factors and breast cancer. I. Parity. *Am J Epidemiol*, **126:**831-841.

Layde, P.M., Webster, L.A., Baughman, A.L. *et al.* (1989) The independent association of parity, age at first full-term pregnancy, and duration of breastfeeding with the risk of breast cancer. *J Clin Epidemiol*, **42:**963-973.

Lin, T.M., Chen, K.P. and MacMahon, B. (1971) Epidemiologic characteristics of cancer of the breast in Taiwan. *Cancer*, **27:** 1497-1504.

MacMahon, B., Cole, P., Lin, T.M. *et al.* (1970) Age at first birth and breast cancer. *Bull World Health Organ*, **43:**209-221.

Negri, E., La Vecchia, C., Bruzzi, P. *et al.* (1988) Risk factors for breast cancer: pooled results from three Italian case-control studies. *Am J Epidemiol*, **128:**1207-1215.

Notzon, F. (1984) International review: Trends in infant feeding in developing countries. *Pediatrics* **(Suppl):**648-666.

Paffenbarger, R.D., Jr., Kampert, J.B. and Chang, H.G. (1980) Characteristics that predict risk of breast cancer before and after the menopause. *Am J Epideimol*, **112:**258-268.

Pathak, D.R. and Whittemore, A.S. (1992) Combined effects of body size, parity, and menstrual events on breast cancer incdence in seven countries. *Am J Epidmiol*, **135:**153-168.

Tao, S.C., Yu, M.C., Ross, R.K. *et al.* (1988) Risk factors for breast cancer in Chinese women of Beijing. *Int J Cancer*, **42:**495-498.

Trichopoulos, D., MacMahon, B. and Cole, P. (1972) Menopause and breast cancer risk. *JNCI*, **48:**605-613.

Wang, Q.S., Ross, R.K., Yu, M.C. *et al.* (1992) A case-control study of breast cancer in Tianjin, China. *Cancer Epidemiol Biomark Prev*, **1:**435-439.

Yuan, J.M., Yu, M.C., Ross, R.K. *et al.* (1988) Risk factors for breast cancer in Chinese women in Shanghai. *Cancer Res*, **48:**1949-1953.


# 胎次、初次生產年齡、哺乳與乳癌關係的病例對照研究


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## 摘 要


利用病例對照研究方法探討胎次、哺乳與乳癌之關係，114名新診斷乳癌的女性病例與年齡配對的228名對照組比較之研究結果發現生產大於三次、初次生產年齡小於30歲及哺乳超過三年的婦女有較低的乳癌危險性。經校正氏族和停經與否，生產大於三次及初次生產年齡小於30歲的婦女仍有顯著較低的乳癌危險性，而哺乳時間則與乳癌無統計相關。胎次與乳癌的相關性經校正初次生產年齡後仍呈顯著相關，表示胎次與初次生產年齡有獨立的作用。經校正哺乳時間，胎次與初次生產年齡仍與乳癌呈顯著相關，此亦表示胎次及初次生產年齡的保護作用不受哺乳因素影響。