

RESEARCH ARTICLE

Relationships between Breast Cancer and Common Non-Communicable Disease Risk Factors: an Ecological Study

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Abstract

Background: Breast cancer is one the most common cause of cancer-related deaths among women worldwide. The aims of this study were to investigate the impact of dietary factors and health status indicators on breast cancer (BC) incidence. **Materials and Methods:** Risk factor data (RFD) of 89,404 individuals (15-64 years old) were gathered by questionnaire and laboratory examinations through a cross sectional study from the Non-Communicable Disease Surveillance Centre (NCDSC) of Iran. BC incidences of all provinces through 2001-2006 segregated by age and gender were obtained from the Cancer Registry Ministry of Health (CRMH). **Results:** a significant positive relationship was seen between diabetes mellitus, fish consumption, percent of academic education and non-consumption of fruit, and breast cancer in women. However, non fish consumption, percent age illiteracy and taking fruit showed a significant negative relationship with the incidence of breast cancer. In addition, multiple linear regression analysis showed associations among percentage with academic education, fruit consumption and diabetes. **Conclusions:** We conclude that dietary factors such as fish and fruit consumption, dairy products, health status indicators, academic education, and some diseases like diabetes mellitus can affect the BC incidence, although the results of ecologic studies like this must naturally be interpreted with caution.

Keywords: Breast cancer - risk factors - correlation - linear regression - ecological study

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Introduction

In developing centuries along with decreases of contiguous diseases and increases in life expectancy, the problems related to cancer would increase. Although breast cancer (BC) after lung and stomach cancers is the third common cancer in the world (Alimohammadian, 2009; Abdulrahman, 2012; Ferlay, 2013) but in Iran BC is after the skin and stomach cancers in men and women (Azizi, 2003). BC is the most common cause of cancer-related deaths among women worldwide. Each year it is newly diagnosed in more than 1.1 million of women worldwide (El-Zaemey, 2012; Youlden, 2012). In Iran, the proportion of BC incidence is about 10 percent of all cancers (Alimohammadian, 2009).

Although incidence of BC is higher in white women rather than black but the mortality rate of BC is higher in black women rather than white. Mortality rate of BC increased by aging of population, whereas 54 percent of BC mortality cases are occurred in people that have 65

or more years old (American Cancer Society Inc, 2013). Individuals have higher socioeconomic statuses (SES) are the high risk group of BC.

Also increases of BC incidence can relate to higher life expectancy, urbanization and acceptance of new life styles (Kim, 2005; Merlo, 2012). Unfortunately, in the end of this decade, incidence of BC increased in women because, they were started to use of cigarette in amidst of 20 century. For example, in a study performed in Denmark, incidence risk of BC in the women who used cigarette for thirty or more years was more than women who didn't use cigarette (Barcenas, 2010).

In year 2008, the incidence of BC in some countries such as Iran, Afghanistan, Azerbaijan, Iraq and Canada were 18.4, 21.3, 24.6, 30.2 and 83.2 per 100000 persons, respectively (Globocan, 2010). Although, incidence of BC in Iran is relatively lower than of neighbor countries (e.g. Iraq and Afghanistan) and developed countries (e.g. Canada) but, it has increasing trend toward these years.

Thereupon, conducted studies determined the risk

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factors of BC and education of people, specially women years of 45 or more, could decrease BC incidence. At present via screening test including mammography could perform secondary prevention for BC (Kaushal, 2010). This study was performed to investigate the impact of dietary factors such as consumption of vegetables, fruits, dairy products, fried foods, fish, salt and factors such as weight, physical activity, hypertension, diabetes, smoking, educational level and marital status on development of BC.

Materials and Methods

This is an ecologic study which examined relationship among most common risk factors of non-communicable disease with BC incidence.

Data collection

The required information about risk factors was obtained from Non-Communicable Disease Surveillance Centre (NCDS) of Iran. These data at first was collected by NCDS in 2005. Important risk factors were used in this study including use of vegetable and fruits, dairy products, fried foods, fish, salt along with food, weigh (BMI), physical activity, hypertension, diabetes, cigarette smoking, education and marital status. Risk factor data (RFD) were gathered by a questionnaire and laboratory examinations through a cross sectional study in all provinces of Iran. RFD was acquired from 89404 individuals who had 15-64 years old by systematic clustering sampling method. The proportion of clusters were related to the number of household in different rural an urban areas.

Breast Cancer (BC) incidence was obtained from Cancer Registry Ministry of Health (CRMH) segregated by age and gender. In this study, age-adjusted incidence of BC was used in all provinces since years of 2001-2006.

Statistical analysis

Statistical analysis was performed using statistical software package (SPSS 18.0, Chicago). At first; the Pearson correlation coefficient between average incidence of BC and proportion of each risk factor was calculated. Afterward, risk factors had statistically significant correlation coefficient were entered in multiple linear regression model for controlling confounding effect or detecting the interaction effects (14). The p value less than 0.05 was considered to be significant.

Results

Trend of breast cancer in Iran

In this section, the incidence of BC in different provinces and the average of Iran per 100000 persons have been described. In years 2001-2003 the least incidence was shown in Charmahal (5.15, 2.78, 7.2, respectively) and the highest incidence was seen in Hormozgan , Isfahan and Yazd (25.78, 22.82, 24.31, respectively). The average of Iran in these years were 13.02, 13.88 and 15.38, respectively. In years 2004, 2005 and 2006 the least incidence was seen in Sistan, Kohkiluyeh and East

Table 1. Pierson Correlation Coefficient of Breast Cancer

Correlation Coefficients	Variables
	Diabetes proportion
	Proportion none use of fish in week
	Proportion use of fish in week
	Alliterated women proportion
	Academic education women proportion
	Proportion none use of fruits in week
	Proportion use of fruits in week

*Correlation is significant at the 0.05 level (2 – tailed); **Correlation is significant at the 0.01 level (2 – tailed)

Table 2. Multiple Linear Regressions Analysis of Breast Cancer

Variables	Unadjusted Coefficients		Adjusted Coefficients	p value
	B	SE	B	
Intercept	13.1	2.09		0.00
Academic education	0.406	0.12	0.44	0.00
Use of fruits in week	0.481	0.17	0.36	0.01
Diabetes	0.629	0.30	0.29	0.04

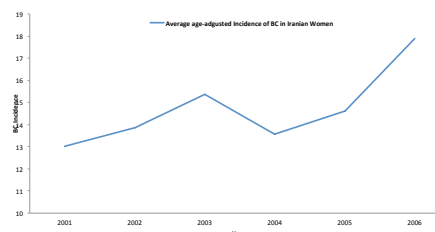


Figure 1. Trend of Breast Cancer in Iranian Women from Years of 2001 to 2006

Azerbaijan (1.96, 3.51, 5.18, respectively) and the highest incidence was seen in Yazd , Isfahan and Tehran (25.46, 31.51, 32.08, respectively). The average of Iran in these years were 13.58, 14.63 and 17.88, respectively. During years of 2001-2006 average incidence of BC increased from 13.02-17.88 in Iran (Figure 1).

Correlation coefficients

Although based on correlation table, a positive relation was seen among BC incidence with diabetes proportion, fish consumption, non use of fruits weekly and academic education proportion, But BC incidence shown a negative relationship with non use of fish, use of vegetables weekly and illiteracy proportion (Table 1).

Among studied factors (Table 1) academic education, use of fish weekly and diabetic women had the highest correlation with incidence of BC (with correlation coefficient of 0.605, 0.529 and 0.496, respectively). Table-1 shows that non use of fish, use of vegetables and illiteracy had a negative correlation (correlation coefficient of -0.503, -0.481 and -0.421, respectively) with BC incidence.

Regression coefficients

Multiple linear regressions analysis showed that academic education, use of fruits weekly and diabetes mellitus have relationship with BC incidence (Table 2).

Discussion

After skin and stomach cancers, BC is the third common cancer in Iranian men and women (Azizi, 2003). Some studies have shown that there is a positive relationship between BC incidences with socioeconomic factors such as academic education (Stewart, 2003).

Along with socioeconomic development other changes occurred in life style of people (e.g. increase of marriage age, more education and etc.) On the other hand, the Positive relationship between BC and academic education might be result of positive confounding of socioeconomic Status (SES).

Since, in these decades, Iran traverses socioeconomic development and usually persons who had higher education also have better SES, so we supposed that these changes may increase the incidence of BC which is consistent with other studies (Helyer, 2010).

However, many type of fruits for example orange and lemon have B and C vitamins and antioxidant elements that may decrease or prevent BC incidences (Blount, 2002; Azizi, 2003; Cullinane, 2005; Greene, 2006). Our findings showed an inverse relationship between BC incidences and use of fruits that is in agreement with some studies (Blount, 2002; Azizi, 2003).

Consistent with some studies we founded a positive relationship Between BC incidences and diabetes mellitus. Also, there is a positive relationship between diabetes and obesity. Since other studies showed that overweight and obesity are risk factors of BC (Helyer, 2010; Alegre, 2013; Kruk, 2013), so these results must be interpreted with caution, because this correlation might be happen by positive confounding of obesity.

A positive relationship was seen between BC incidences and use of dairy products but this finding not found in any study. In many studies fatty foods introduced as BC risk factors (Cai, 2000; Kim, 2005). Some dairy products (e.g. yogurt and butter) have very saturated fat that probably could legitimize this finding. Furthermore, some collecting dairy companies adding magnesium hydroxide to prevent milk rancidity, so it is necessary to examine whether this material could be cause of cancer.

Contrast to our study, positive impact of fish consumption was found in no study. Since persons belong to higher SES probably consume more fish and some studies reported the relation of SES with BC incidences (Stewart, 2003) so this finding might be resulted from the positive confounding of SES.

In conclusion, we conclude that dietary factors such as fish and fruit consumption, dairy products, health status indicators, academic education, and some disease like diabetes mellitus could affect the BC incidence and might be preliminary preventable. Since many factors detected as risk factors of BC are constellation variable that contain several other variables so these relationships might occur by others unmeasured variables and the study might have ecological fallacy. Thereupon, findings of this study could not interpret as independent factor and may be clues for future studies.

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