Introduction

Breast cancer is one of the most common types of cancer in the world, with 1.3 million people affected and causing 458000 death, only in the year 2008 [1]. Breast cancer has become one of the most important causes of death among women, especially in menopausal age. It usually occurs due to genetic changes in somatic cells of the breast. But it can also be caused by genetic heritage; Genetic map could be a predisposing factor to the development of breast cancer.

In addition to mentioned factors, obesity has also attributed to causing of disease [2]. Studies suggested that obesity is a risk factor for breast cancer after menopause, and also increase in BMI can lead to breast cancer deterioration and decrease in life span [3].

Abstract

Introduction: Adiponectin is one of the plasma protein derived from adipose tissue which has a positive effect on the metabolism of fat and lipid, resulting from its own receptors. Increase in body mass index (BMI) has a direct relationship with life length. Obesity has effects on secretion of some hormones related to adipokines. Adiponectin is an adipokine having an opposite relationship with insulin resistance and breast cancer. It is also the connection between breast cancer incidence and obesity. Adiponectin level decreases in women affected by breast cancer and knowing this fact can help treat and prevent the cancer by giving adiponectin supplements. The present study compared the adiponectin levels in women affected by breast cancer and healthy females as a control group.

Method: in this study, 80 women with breast cancer and 80 healthy females as controls were selected and adiponectin level was compared between them. Result: the group with breast cancer, having a higher BMI mean (28.77 ± 6.05), showed a lower adiponectin level in comparison to control group. (p= 0.0001). Conclusion: Considering the fact that the risk is higher in women with bigger BMI value, informing women in this regard could have a great effect on preventing this wide-spread disease. Taking adiponectin supplements as pills or injection could be a preventing step for breast cancer, which needs to be considered as targets for future studies.

Keywords: Adiponectin- breast cancer- BMI

Growing trend of high-fat diet, which induces insulin resistance and subsequently obesity, is one of the greatest risk factors for diabetes and cardiovascular diseases. The molecular basis of this causal link has been discovered: adipose tissue, as the center of triglyceride and free fatty acids production, releases glycerol in response to the need for energy. Also as an important endocrine organ, it produces some active biologic adipokines such as free fatty acid, adipsin, leptin, plasminogen, inhibitor activator, resistin, and TNFα [4]. Adiponectin is one of these adipokines that has recently received more attention.

Adiponectin is a protein with 244 amino acids, secreted from white adipose tissue, and has a crucial role in adjusting metabolism of fat and glucose [5]. It is also known as ACRP30 [3, 5-7]

Adipose tissue, being crucial for growth and
development of mammary gland, is one of the most important syntheses of lipid glands in animals [8]. One of the most significant factors, derived from lipid (adipokines), is adiponectin (ANP) [8]. Studies have shown that serum concentrations of adiponectin have an adverse effect on BMI and insulin resistance [8]. Adiponectin gene, encoding 244 amino acids to produce adiponectin, is placed on chromosome 27q3, which is associated with metabolic syndrome and diabetes type 2 [5, 7]. This gene has two introns and three exons [7].

One of the adipokines that play an important role in the directive relationship between breast cancer and obesity is adiponectin. It is the most crucial adipocytokine in the bloodstream. While other cytokines, like leptin, cause obesity and heart disease, adiponectin decreases in obesity [9, 10]. This effect may be for this reason that although by producing adipose tissue the level of adiponectin increases, but has a restraining feedback on its own production [10].

Increase in weight and adipose tissue among adults has a direct relationship with breast cancer in menopausal women and inversive effect in pre-menopausal females [11, 12]. Researchers have shown that lower levels of total adiponectin or HMW are correlated with increase of breast cancer risk in menopausal women [13, 14].

The present study compared the adiponectin levels in women affected by breast cancer and healthy females as a control group, in Mashhad. Since the current investigation was performed for the first time in Iran, the findings would be helpful in this field.

Materials and Methods

In this study, using the case-control method, the data were analyzed by SPSS software. The correlation coefficient was considered 95% and power of correlation test 80%. Using data derived from another study [15], the concluded sample size was 40 cases for cancer group and 40 for the control group.

80 cases of women, who were newly diagnosed with breast cancer and received no treatment yet, were chosen from patients of a cancer specialty hospital as case group. For the control group, 80 healthy women who were among referents in a private laboratory were selected. The criterion considered for choosing women with breast cancer was that no patient should have received any treatment as radiotherapy and chemotherapy which are intervening factors. About control group also the criterion was having no record of cancer suffering in the past and having a healthy body.

Age, height, and weight of females in both groups were asked and their BMI was calculated accordingly. The range of ages was considered 30 to 70, and females lower and above this range were eliminated from the study. All women were asked to show their consent in participating in the investigation through a consent form. The data of the ones who didn’t show an inclination to take part in the study were omitted accordingly. Eventually, 40 females matching criteria were selected for case group and 40 women with considered features were chosen for the control group. The data was gathered in 3 months and then was analyzed. In this study, the Elisa method was applied. It is not necessary

Statistical analysis

The gathered data was coded and then analyzed by SPSS software. To test the validity of the assumptions of the study, the independent T-test and Pearson correlation was applied.

Results

Distribution Analysis of participants’ age

On average, the age of participants in the control group was 50.68 ± 11.31 and in the case group was 46.45 ± 9.37. Since the age women as the intervening variable can affect the level of adiponectin and other variables of the study, the age between two groups was compared. According to the results of T-student or independent T-test, there was a significant difference between two groups (p = 0.011).

Distribution Analysis of participants’ BMI

BMI mean was 26.04 ± 4.5 for the control group and 28.77 ± 6.05 for case group. Since the BMI of females as an intervening variable can affect the variables of the study, it was compared between two groups. The results of T-test showed that there was a significant difference between two groups (p = 0.06).

Frequency distribution of adiponectin in control and case group

Diagram 1 shows frequency distribution of adiponectin in control group and diagram 2 depicts that of case group. As can be seen, the mean frequency of control group is 11.48 ± 4.05 and 8.63 ± 2.85 for case group. The result of T-test showed a significant difference between two groups (p = 0.0001).

The correlation between adiponectin level and weight, height, BMI, and age was determined by Pearson correlation test whose results are shown in Table 1.
level and breast cancer incidence. The results showed an inverse connection between these two variables [13]

In conclusion, the purpose of this study was to identify the correlation between adiponectin level and breast cancer incidence. Knowing that there is an inverse relationship between these two, we can anticipate the risk of cancer in women by measuring adiponectin level. Considering the fact that the risk is higher in women with bigger BMI value, informing women in this regard could have a great effect on preventing this wide-spread disease. Taking adiponectin supplements as pills or injection could be a preventing step for breast cancer, which needs to be considered as targets for future studies.

References


**Table 1. Pearson correlation test between adiponectin level and age, height, weight, and BMI of the participants**

<table>
<thead>
<tr>
<th>Group</th>
<th>Variable</th>
<th>P-Value</th>
<th>R</th>
</tr>
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<tbody>
<tr>
<td>Control</td>
<td>Age</td>
<td>0.582</td>
<td>-0.063</td>
</tr>
<tr>
<td></td>
<td>Height</td>
<td>0.007</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>Weight</td>
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<td>BMI</td>
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</tr>
<tr>
<td>Case</td>
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<tr>
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<td>Height</td>
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<tr>
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<td>Weight</td>
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</tr>
<tr>
<td></td>
<td>BMI</td>
<td>0.06</td>
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</tbody>
</table>

**Discussion**

As the results of present study show, there is a significant difference between the age of the cancer group and that of the control group. This variable showed a bigger mean value in control group which indicated no dependency between developing breast cancer and adiponectin level. These results are in contrast to the findings of a study conducted by Mantzoros et al. in 2004. The study compared decreased adiponectin level in menopausal and pre-menopausal women affected by breast cancer. It reported a large decrease in pre-menopausal women [6].

As for the BMI variable, independent from a variable of age, there was a bigger BMI mean value in control group which indicated no dependency between developing breast cancer and adiponectin level. These results are in contrast to the findings of a study conducted by Mantzoros et al. in 2004. The study compared decreased adiponectin level in menopausal and pre-menopausal women affected by breast cancer. It reported a large decrease in pre-menopausal women [6].