

A Retrospective Study to Assess the Clinical Utility of Serum Leptin, and Visfatin in Diagnosis Cancer Breast

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Abstract

Aim: The aim of the present study was to assess the clinical utility of serum Leptin, and visfatin, in women with breast cancer for diagnostic and prognostic purpose.

Methods: This study was carried in the Department of Biochemistry, Jawaharlal Nehru Medical College, Bhagalpur, Bihar, India for one year. The subjects enrolled in the study were divided into (50) breast cancer women and (50) apparently healthy women. The parameters were estimated by standard biochemical methods.

Results: The study included age and its class of groups, so the statistical tests show the highest percentage of age for women with breast cancer equal to (32%) in the age group (56-65) years, with a mean age of 51.19 years. 52% women had breast cancer in cases and 48% women had breast control in controls. The highest rate of disease was among women living in rural areas (62%), while it was for women who reside in the urban areas (38%). The study showed that the vast majority of women with breast cancer suffer from obesity. The mean BMI \pm SD was 29.55 \pm 8.27 versus 25.02 \pm 4.86 kg/m² for casualties and intact, respectively. The highly significant increase in mean serum Leptin and Visfatin was observed in carcinoma breast patients when compared to controls ($p < 0.001$). The accuracy of leptin and visfatin was 0.105 and 0.101 respectively.

Conclusion: The study showed that breast cancer patients had significantly higher levels of Leptin, Visfatin.

Keywords: Breast cancer, endocrine tissue, leptin, visfatin

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Introduction

Breast cancer (BC) is one of the most widespread kinds of nonskin malignant neoplasm, showing a growing incidence worldwide. [1-3] BC generally begins with ductal hyperproliferation and develops into benign tumors and/or metastatic carcinomas upon constantly being stimulated by different carcinogenic factors. [4] This cancer is associated with age, genetic history, hormonal status, lifestyle, and obesity. [1,5,6]

Furthermore, adipocyte-secreted hormones play a substantial role in developing this cancer. [7] Endometrial cancer (EC) is the most prevalent gynecologic malignancy. [8] In postmenopausal women, abnormal uterine bleeding is usually associated with EC. [9] Metabolic disorders, inflammation, impaired immunity, obesity, and hypertension are considerable risk factors. Evaluation of endometrial biopsies, endometrial curettage, and hysterectomy specimen can facilitate disease diagnosis. [9] Postmenopausal women with a mean age of 68 are patients mostly diagnosed with

EC. In recent years, the prevalence of EC has been increasing. [10]

Adipose tissue, as an endocrine organ, is involved in immunity and homeostasis. This tissue secretes adipocytokines such as visfatin, resistin, and leptin, which may be helpful in the prognosis and diagnosis of cancer¹¹ which can be beneficial for cancer prognosis and diagnosis. [11] Visfatin was identified in 2005. It is a large 52 kDa protein, with its gene being located on chromosome 7q22.2. Visfatin is recognized as pre-B-cell colony-enhancing factor 1 (PBEF1) or nicotinamide phosphoribosyl-transferase (NAMPT). [12] Tumor epithelial cells secrete visfatin autocrinally. Visfatin affects both normal and neoplastic mammary tissues by endocrine and paracrine mechanisms. It involves various metabolic pathways within mammalian cells, such as oxidation of fatty acids, growth, apoptosis, and angiogenesis. [12,13] Some investigations have also reported on its inflammatory effects. Altered serum visfatin levels

are associated with different cancers, including breast, endometrial, gastric, and colon. [13]

The aim of the present study was to assess the clinical utility of serum Leptin, and visfatin, in women with breast cancer for diagnostic and prognostic purpose.

Materials and Methods

This study was carried in the Department Of Biochemistry, Jawaharlal Nehru Medical College, Bhagalpur, Bihar, India for one year. The subjects enrolled in the study were divided into (50) breast cancer women and (50) apparently healthy women. The parameters were estimated by standard biochemical methods.

Paraclinical investigation

Fasting blood samples (5 ml) were collected from the patients and the control group to measure the leptin level. Blood samples were centrifuged at 3000 rpm for 5 min to separate serum. Then, it was stored at a temperature below -24°C until the time of the tests. Leptin levels were measured via the radioimmunoassay method, using a Metasciences kit manufactured in Iran (sensitivity 15.63–1000 pg/ml).

Statistical Analysis

Data were analyzed using the SPSS software, version 22. The Kolmogorov–Smirnov test confirmed the normality of the data. Parametric statistical tests, including Pearson test, independent t-test, and analysis of variance, were performed. P-value < 0.05 was considered as a significant level.

Results

Table 1: Baseline characteristics

Age groups in years	Cases	Controls	Total
26-35	5	4	9
36-45	10	11	21
46-55	16	12	30
56-65	14	18	32
66-75	5	5	10
Total	50	50	100
Breast cancer			
Yes	26	24	
Area			
Rural	31	29	60
Urban	19	21	40
BMI	29.55 \pm 8.27	25.02 \pm 4.86	

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rural areas (62%), while it was for women who reside in the urban areas (38%). The study showed that the vast majority of women with breast cancer suffer from obesity. The mean BMI \pm SD was 29.55 \pm 8.27 versus 25.02 \pm 4.86 kg/m² for casualties and intact, respectively.

Table 2: Comparison of serum levels of leptin and visfatin between controls and carcinoma breast cases

Parameters	Mean \pm SD Controls	Mean \pm SD cases	P Value
Leptin (NG/ML)	16.98 \pm 1.17	19.38 \pm 1.37	<0.001
Visfatin (NG/ML)	31.14 \pm 5.07	40.35 \pm 7.11	<0.001

The highly significant increase in mean serum Leptin and Visfatin was observed in carcinoma breast patients when compared to controls (p<0.001).

Table 3: Comparison of diagnostic tests of the studied Parameters tests for breast cancer women

Variable	Leptin	Visfatin
Sensitivity Sn	0.91	0.89
Positive Predictive Value (PPV)	0.81	0.85
Specificity Sp	0.86	0.88
Negative Predictive Value (NPV)	0.90	0.88
Accuracy	0.105	0.101

The accuracy of leptin and visfatin was 0.105 and 0.101 respectively.

Discussion

Breast cancer (BC) is a malignant neoplasm characterized by abnormal cell growth of breast tissue in an uncontrolled pattern and their ability to infiltrate and invade normal tissue locally. It is a form of cancerous tumor that affects the breast tissue and appears in the ducts of the tubes that carry milk to the nipple and milk glands. [14,15] Breast cancer (BC) is the second most common cancer worldwide and the most frequent malignant disease, with an estimated 2.3 million cases and 685,000 deaths in 2020, and the cases are expected to reach 4.4 million in 2070. Its etiology and causative factors are complex and interlinked which includes family history, gene susceptibility, hormone, diet, lifestyle factors and environmental exposures. [16,17]

The study included age and its class of groups, so the statistical tests show the highest percentage of age for women with breast cancer equal to (32%) in the age group (56-65) years, with a mean age of 51.19 years. 52% women had breast cancer in cases and 48% women had breast control in controls. The highest rate of disease was among women living in rural areas (62%), while it was for women who reside in the urban areas (38%). The study showed that the vast majority of women with breast cancer suffer from obesity. The mean BMI \pm SD was 29.55 ± 8.27 versus 25.02 ± 4.86 kg/m² for casualties and intact, respectively. The highly significant increase in mean serum Leptin and Visfatin was observed in carcinoma breast patients when compared to controls ($p < 0.001$). The accuracy of leptin and visfatin was 0.105 and 0.101 respectively. The overexpression of leptin detected in triple-negative mammary carcinomas is also in concordance with previous results in triple-negative breast cancer, where leptin signaling is crucial for tumor growth. [18]

Present study showed that leptin levels which was significantly higher in women with breast cancer and when compared healthy group. Zeinab et al [19], Manar et al [20] and Adel et al [21] which illustrated that breast cancer patients had significantly higher serum leptin levels than healthy controls. Another similarity to the study's results was shown by Pan et al [22] who presented that leptin levels were found to be higher in breast cancer patients, especially in overweight or obese women. Visfatin impacts mammary tissues through endocrine and paracrine mechanisms, involving metabolic pathways like fatty acid oxidation, growth, apoptosis, and angiogenesis within mammalian cells. [23] NAMPT, it was a key rate-limiting enzyme in the biosynthesis of NAD⁺, which partly explained the elevated NAMPT expressions in patients with malignant tumors. [24]

In our study a highly significant increase in serum visfatin was observed in carcinoma breast patients as compared controls, ($p < 0.001$). These results were in agreement with the results of Shaoxue [25] and Sarhat et al. [26] Possible mechanisms assumed that: First, Visfatin, a proinflammatory molecule produced by adipose tissue macrophages, may inhibit macrophage apoptosis triggered by various endoplasmic reticulum (ER) stressors. Visfatin increases IL-6 protein secretion, activating pro survival signal transducer and transcription 3, potentially contributing to obesity-associated diseases like inflammation or tumorigenesis. Additionally, The increase in visfatin is directly linked to the rise of Sirt6, which in turn, post-transcriptionally, contributes to the upregulation of TNF- α . [27,28]

Conclusion

The study showed that breast cancer patients had significantly higher levels of Leptin, Visfatin.

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