

DOI: <http://doi.org/10.32792/utq.jceps.11.01.02>

The Role of Adiponectin Hormone and some Biochemical Parameters in Women with Invasive Ductal Carcinoma of the Breast in Thi-Qar Province-Iraq

Hadeel Rashid Faraj*, Husam Mohammed Kredy*, Maha Shakir Hasan **

Chemistry Dept. College of Science – University of Thi-Qar ** College of Medicine – University of Thi-Qar

Department of Mathematics, collage of Education for Pure Sciences, University of Thi-Qar.

Received 09/05/2021 Accepted 01/08/2021 Published 11/11/2021



This work is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

Abstract:

Breast cancer is the most frequently diagnosed cancer and is a common cause of cancer related death in women, accounting for 25% of cancer cases and 15% of cancer-related deaths worldwide. The present study was designed to determine and compare the levels of Adiponectin hormone, Vitamin D₃, Calcium, Alkaline phosphatase, and C- reactive protein among women with Invasive ductal carcinoma & healthy individuals. The study was designed to determine and compare the levels of serum Adiponectin hormone, Vitamin D₃, Calcium, Alkaline phosphatase, and C- reactive protein levels were measured in eighty -five patient's Invasive ductal carcinoma and seventy-five supposed healthy subjects. The levels of serum Adiponectin hormone, Vitamin D₃, were revealed significant decrease among patients with Invasive ductal carcinoma as compared to control group whereas the levels of Calcium, Alkaline phosphatase, and C- reactive protein showed a significant increase in Invasive ductal carcinoma patients in comparison to control subjects ($P \leq 0.05$). This present study indicated that low blood adiponectin level was associated with the risk of obesity-related malignancies, including breast cancer, we can conclude that deficient of vit. D₃ may contribute to the process of carcinogenesis among the breast cancer patients, and our findings revealed significant in Calcium, Alkaline phosphatase, and C- reactive protein levels among patients with Invasive ductal carcinoma.

Keywords: Breast cancer, Invasive ductal carcinoma, Adiponectin hormone, Vitamin D₃, Calcium, Alkaline phosphatase, and inflammatory marker C- reactive protein.

INTRODUCTION:

Breast cancer is the most frequently diagnosed cancer and is a common cause of cancer related death in women, accounting for 25% of cancer cases and 15% of cancer-related deaths worldwide (Torre L. *et al.*, 2017). Invasive ductal carcinoma which is the most common type comprises 50- 75% of all breast cancers (Dillon D. *et al.*, 2010). The circulating adiponectin levels are inversely associated with the risk of obesity-related malignancies, including breast cancer (Tworoger *Set al.*, 2007). Low blood concentrations of adiponectin are associated with high incidence and poor prognosis of breast cancer (Fu Y. *et al.*, 2005). Vitamin D deficiency is also associated with secondary elevation in Para thyroid hormone (PTH) serum levels which has carcinogenic and tumor promoting effects. Hence, may lead to an increased risk of breast cancer (Hoey R. *et al.*, 2003).

Calcium is involved in many cellular process including those involved in the process of carcinogenesis, as gene transcription, cell motility, angiogenesis, calcium regulates various cellular processes, including those

relevant to tumorigenesis, such as cell motility, angiogenesis, gene transcription, apoptosis and proliferation (Dickinson H. *et al.*, 2006).

Increase serum level of elevated activity of alkaline phosphatase (ALP) in patients with malignancies including metastatic breast cancer (Ijaz A. *et al.*, 2006).

Researchers proposed that serum C- reactive protein (CRP) could be a marker of increased risk for breast cancer, estimation of CRP can be looked at as a simple, cost effective, easily available screening test to assess future risk of breast cancer (Guo L. *et al.*, 2015).

MATERIALS AND METHODS

The current study is a kind of prospective study. The samples are obtained from the patients who participated in specialist clinics and the oncology center in Al-Habooby Hospital. The eighty-five samples of blood were obtained from the patients of invasive ductal carcinoma, and seventy-five samples of blood were obtained from normal women as a control group. Around five milliliters of blood was obtained and permitted to clot at normal temperature for ten minutes in hollow disposable centrifuge tubes for the separation in a centrifuge at 3000 xg.

The samples of serum were stored and separated at the temperature of minus twenty-degree centigrade before analyzing for Adiponectin hormone, vitamin D3, Calcium, Alkaline phosphatase, and C-reactive protein. The enzyme linked immunoassay technique was used to estimate serum Adiponectin using ELISA Reader. The kit was provided by Elabscience which is located in the USA.

The sandwich immune detection method was used to estimate serum vit.D3 and CRP using I chroma™. The kit was provided by Boditech , Korea.

The enzymatic colorimetric method by (UV/VIS spectrophotometer) analyzed Serum Calcium, and the kit was provided by Biolabo, France.

The enzymatic colorimetric method by (UV/VIS spectrophotometer) analyzed Serum Alkaline phosphatase (ALP) ,and the kit was provided by Biomerieux, France.

The results of the experiment are presented in the form of mean ± standard deviations. The parameters in various studied groups were compared using one-way ANOVA-test. The P-values ($P \leq 0.05$) were taken very significant in this regard.

RESULTS

In this work, we determined the effect of this disease on the **Adiponectin hormone, vitamin D3, Calcium, Alkaline phosphatase, and C-reactive protein** .

ADP hormone, vitamin D3 were showing a significant decrease in the patients of invasive ductal carcinoma in comparison to the control group.

Calcium, ALP, and CRP were showing a significant increase in the patients of invasive ductal carcinoma in comparison to the control group.

Table (1):- Serum ADP Hormone levels of control and invasive ductal carcinoma

Group	No.	ADP levels (ng/ml) Mean ± SD
control	75	6.74±1.69 ^a
patients	85	0.50±0.11 ^b

Note: Each value represents mean ± SD values with non-identical superscript (a , b or c...etc.) , were considered significantly differences (P≤ 0.05).

-No: Number of subjects.

-SD: Standard deviation.

Table (2):- Serum Vit. D3 levels of control and invasive ductal carcinoma

Group	No.	Vit D3 levels (nmol/L) Mean ± SD
control	75	30.50±2.40 ^a
patients	85	21.98±1.20 ^b

-Legend as in table (1).

Table (3):- Serum Calcium levels of control and invasive ductal carcinoma

Group	No.	Calcium levels (mmol/L) Mean ± SD
control	75	2.27± 0.11 ^b
patients	85	2.73±0.19 ^a

-Legend as in table (1).

Table (4):- Serum ALP activity of control and invasive ductal carcinoma

Group	No.	ALP activity (U/L) Mean ± SD
control	75	67.32± 13.84 ^b
patients	85	132.89±21.50 ^a

-Legend as in table (1).

Table (5):- Serum CRP levels of control and invasive ductal carcinoma

Group	No.	CRP levels (mg/L) Mean ± SD
control	75	6.84±1.76 ^b
patients	85	11.81± 1.18 ^a

-Legend as in table (1).

DISCUSSION:

Invasive tumors spread from the original site (either milk duct or lobules) into surrounding tissue of the breast and may spread to lymph nodes and/or other parts of body (Dillon D. *et al.*, 2010; Merajver S. *et al.*, 2010).

Our finding agree with (Ahmed S. *et al.*, 2015) studied 175 diagnosed breast cancer patients and 175 healthy controls .They found serum adiponectin was significantly decreased in breast cancer cases when compared to control subjects, had a statistically significant difference ($P<0.05$). Several studies have demonstrated that low serum adiponectin levels are associated with increased risk for breast cancer (Chlebowski R. *et al.*, 2005 ; Mohan R. *et al.*, 2012; and Hdeel R. *et al.*, 2019). Obesity is significantly associated with hypoadiponectinemia agrees with a study done by (Haluzik M. *et al.*, 2004).

Laboratory studies have demonstrated that vitamin D3 and its analogs inhibit cell proliferation and promote apoptosis in cancer cells (Sergeev I., 2012 ; Balasubramanian S. and Rotti S., 2013). Calcium are strongly correlated and share similar anti carcinogenic effects on mammary gland. Hence, any apparent effect of vitamin D on breast cancer risk might be due in part to an effect of calcium and vice versa. However, few epidemiologic studies have investigated the joint and independent effects of vitamin D and calcium on breast cancer risk (McCullough M. *et al.*, 2005).

The progressive increase in the serum alkaline phosphatase (ALP) activity in breast cancer patients is an indication of metastasis (Ramaswamy G. *et al.*, 2000; Mishra S. *et al.*, 2004).

Elevation of serum ALP occurs because of the accelerated denovo synthesis of the enzyme and subsequent regurgitation into the serum , the serum alkaline phosphatase level is a better predictor for metastatic breast cancer in comparison to other parameters activities as its level gradually increases as the stages advances. CRP is an important biomarker of chronic inflammatory processes that may explain health challenges among women following breast cancer diagnosis, for example, higher CRP levels have been implicated in reduced disease-free survival and higher risk of mortality among breast cancer patients (Allin K. *et al.*, 2011; Villaseñor A. *et al.*, 2014) .

Epidemiological prospective study proved CRP as a well-established independent prognostic marker in breast cancer (Sicking I.*et al.*, 2014).

CONCLUSIONS:

The data provided in this study helped to reach the below conclusions: 1- This present study indicated that low serum adiponectin level was associated with the risk of obesity-related malignancies, including breast cancer.

2- Based on the findings in this study, especially low levels of vit.D3, we can conclude that deficient of vit.D3 may contribute to the process of carcinogenesis among the breast cancer patients.

3-Serum calcium levels were positively associated with breast cancer risk in premenopausal and/or overweight women.

4- An increase in alkaline phosphatase activity was found in sera with patients with invasive ductal carcinoma.

5- A clear relationship between elevated CRP levels and prognoses indicates that CRP could be useful in predicting prognoses in advanced cancer patients.

REFERENCES:

- ◆ **Ahmed S.D1., Khanam A., Sultan N., Idrees F., and Akhter N. (2015).** Serum Adiponectin Level Association with Breast Cancer Risk: Evidence from a Case- Control Study, *Asian Pac J Cancer Prev.* 2015;16(12):4945-8.
- ◆ **Allin K.H. , Nordestgaard B.G., Flyger H., Bojesen S.E.(2011).** Elevated pre-treatment levels of plasma C-reactive protein are associated with poor prognosis after breast cancer: a cohort study. *Breast Cancer Res ; 13(3):R55.*
- ◆ **Balasubramanian S.M. and Rotti S.B. (2013).**Risk factors of female breast carcinoma: a case control study at Puduchery. *Indian J Cancer ;50:65e70.*
- ◆ **Chlebowski R.T., Chen Z., Anderson GL., Rohan T., Aragaki A., et al. (2005).** Ethnicity and breast cancer: factors influencing differences in incidence and outcome, *J Natl Cancer Inst 97: 439–448.*
- ◆ **Dickinson H.O., Nicolson D.J., Campbell F., Cook J.V., Beyer F.R., and Ford G.A.(2006).** Magnesium supplementation for the management of essential hypertension in adults. *Cochrane Database Syst Rev; 3: CD004640.*
- ◆ **Dillon D.A., Guidi A.J., and Schnitt S.J.(2010).** Chapter 28: Pathology of Invasive breast Cancer, in Harris JR, Lippman ME, Morrow M, Osborne CK. *Disease of the Breast, 4th edition, Lippincott Williams and Wilkins.*
- ◆ **Fu Y., Luo N., Klein R.L, and Garvey W.T. (2005).** Adiponectin promotes adipocyte differentiation, insulin sensitivity, and lipid accumulation, *J Lipid Res, 46: 1369-79.*
- ◆ **Guo L., Liu S., and Zhang S. (2015).** “C-reactive protein and risk of breast cancer: a systematic review and meta-analysis,” *Scientific Reports*, vol. 5, Article ID10508.
- ◆ **Hadeel R. F., Husam M. K., Maha S. H.(2019).** Clinical Study of the Serotonin, Melatonin, Estradiol, and Adiponectin Hormones in Women with Breast Cancer in Thi – Qar Governorate – Iraq. *International Journal of Pharmaceutical Quality Assurance ; 10(1); 151-155.*
- ◆ **Haluzik M., Parizkova J., and Haluzik M.M. (2004).** Adiponectin and its role in the obesity-related insulin resistance and related complications, *Physiol Res, 53: 123- 9.*
- ◆ **Hoey R.P., Sanderson C., Iddon J., Brady G., Bundred N.J., and Anderson N.G.(2003).** The parathyroid hormone-related protein receptor is expressed in breast cancer bone metastases and promotes autocrine proliferation in breast carcinoma cells. *Br J Cancer ; 88: 567-73.*
- ◆ **Ijaz A., Mehmood T., Qureshi A.H., Anwar M., Dilawar M., Hussain I., Khan F.A. , Khan D.A. , Hussain S. , and Khan I.A.(2006).** Estimation of ionized calcium, total calcium and albumin corrected calcium for the diagnosis of hypercalcemia of malignancy. *J. Coll Physicians Surg Pak.; 16(1):49-52.*
- ◆ **McCullough M.L., Rodriguez C., Diver W.R., Feigelson H.S., Stevens V.L., Thun M.J., Calle E.E.(2005).** Dairy, calcium, and vitamin D intake and postmenopausal breast cancer risk in the Cancer Prevention Study II Nutrition Cohort. *Cancer Epidemiol Biomarkers Prev;14:2898 – 904.*
- ◆ **Merajver S.D., Iniesta M.D., and Sabel M.S.(2010).** Chapter 62: Inflammatory Breast Cancer, in Harris JR, Lippman ME, Morrow M,