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Evaluation CA15-3, Blood Urea and Creatinine in Breast Cancer Comen

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Abstract:

The current study was conducted on 90 women divided into three groups: G1 included 30 women with breast cancer, and G2 included 30 women with breast cancer that received a single dose of treatment and 30 women as the control group (healthy), the ages of the groups ranged between (27-25) years, as the samples were collected from the Oncology Hospital of the Medical City in Baghdad Governorate, for the period between 1/11/2022 to 1/2/ 2023. Where about 5 ml of blood was collected from the blood of the groups of patients as well as from healthy women and the samples were divided based on the type of test, after placing them in jell tubes free of anticoagulant and leaving the blood at a temperature of 25 ° C until it coagulates and then placed in a centrifuge for 10 minutes at a speed of 3000 cycles/minute and then the serum was obtained and then placed in Eppendorf and kept in deep freezer at a temperature of -20 ° C for the purpose of Measure the levels of CA15-3 urea and creatinine in s with breast cancer women.

The results of the current research showed a significant increase in the cancer antigen CA15-3 in the serum of G1 and G2, compared to the control group with a significant decrease in the G2 group compared to G1, while urea and creatinine showed a significant increase in the serum of G2compared to G1 and healthy women.

Keywords: CA15-3, breast cancer, urea, creatinine.

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Introduction:

Cancer is one of the diseases that result from cell division and these cells have the ability to spread to different parts of the body, healthy cells are subject to stimuli that determine whether the cell will multiply, differentiate or die, but cancer cells are not affected and are independent of these signals, leading to tumour growth and spread [1]. In addition, cancer is a disease in which somebody cells grow uncontrollably and spread to other parts of the body [2]. It is one of the diseases that result in cell division, and these cells have the ability to spread to different parts of the body, so healthy cells are subject to stimuli that determine whether the cell will multiply, differentiate or die, but cancer cells are not affected and are independent of these signals, which leads to tumor growth and spread [3]. Therefore, many types of cancers have been diagnosed, including the most common at the moment is breast cancer, as more than 1,668 cases have been diagnosed in Baghdad in 2018 [4].

CA15-3 is a natural product protein for breast tissue but in the case of a carcinogenic tumour in the breast, the level of CA15-3 increases with an increase in the number of cancer cells in the body [5]. CA15-3 rises in more than 79-92% of patients with advanced breast cancer and their use is useful to find knowledge of that stage and be a slight decrease relative to successful treatment and therefore needs a period to verify the significant decline of the antigen [6].

In addition, kidney function has several variables, including urea, creatinine, uric acid, Blood Urea nitrogen and creatinine are the end products of nitrogen metabolism in humans, and they are easily filtered from nephrons due to their small size, as Blood Urea nitrogen is usually reabsorbed at a rate of 30% to 40% from tubules [7, 8]. The use of urea as an indicator of kidney function may not be a good diagnostic marker because it is influenced by many factors such as a high-protein diet and variables in protein synthesis [9]. Measuring creatinine concentration in plasma and urine samples can demonstrate the filtration capacity of glomeruli, also known as glomerular filtration rate (GFR). This property makes creatinine a useful marker for a decrease in glomerular filtration rate, as in kidney disease [10].

Materials and Methods:

Sample collection: The current study was conducted on (90) blood samples that were divided into three groups:

G1 included 30 samples from women with breast cancer (newly diagnosed)

G2 30 samples from women with breast cancer who received one dose of treatment

The control group (healthy) numbered (30) blood samples.

The ages of the groups ranged between (27-25) years, as samples were collected from the Oncology Hospital of the Medical City in Baghdad Governorate, from 1/11/2022 to 1/ 2/2023. Where about 5 ml was collected from the blood of the groups of patients as well as from healthy people, and the samples were divided based on the type of test, after placing them in jell tubes s and then placed in a centrifuge for 10 minutes at a speed of 3000 cycles/minute and then the serum was obtained and then placed in Eppendorf and kept in deep freezer at a temperature of -20 ° C to measure the levels of Fetuin-A CA15-3 blood urea and serum creatinine.

Determination of the level of CA15-3 antigen:

Determination of the level of CA15-3 antigen in serum was estimated by using ready-made examination kits, the ELISA technique.

Determination of serum urea:

The serum urea concentration level was estimated using the ready-made serum urea determination kit [11].

Serum creatinine concentration:

The serum creatinine concentration was estimated using a ready-made kit based on Jaffe and Henry's [12] chromatic methods.

Statistical analysis:

The SPSS - Statistical Package for the Social Sciences using the Dunkin' polynomial statistical program test was used to compare patient groups and healthy people as a control group, at the probability level ($p \leq 0.05$), between the data under study.

Results and Discussion:

Table 1 shows the mean ± standard deviation of the level of CA15-3 antigen, urea and creatinine for patients with breast cancer compared to healthy women as shown in Figure 1**.**

Table (1): Shows the mean ± standard deviation in the serum of the samples under study

Parameters	Mean ± S.D			P
	Control	G1	G2	
CA15-3 U/ml	3.085±0.378c	54.680±18.916a	32.345±11.901b	≤0.05
Urea (mg/dl)	31.249±0.711b	32.398±1.280b	45.008±9.388a	≤0.05
Creatinine(mg/dl)	0.744±0.029b	0.790±0.049b	1.307±0.355a	≤0.05

-Different letters indicate significant differences, while similar ones do not have
-significant differences. G1 refers to women with breast cancer without a treatment.
-G2 refers to the group of women with breast cancer receive a single dose.

Level of serum CA15-3

Table (1) shows that the mean± standard deviation of the serum CA15-3 was (54.680±18.916) IU/ml in G1 and (32.345±11.901) IU/ml in patients of G2 compared to (3.085±0.378) units/ml in healthy women, the results showed a significant increase in the level of cancer antigen in the blood serum of group G1and G2 compared to the control group at the level of probability (P≤0.05), and the results showed a significant decrease in the level of antigen Cancer in group G2 serum compared G1as shown in Figure 1.

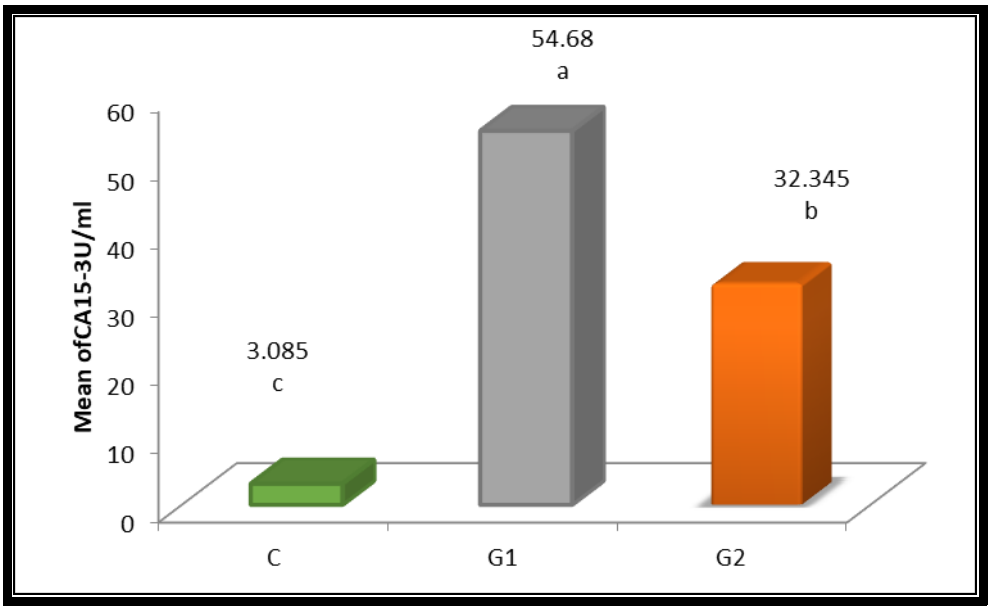

Figure 1: mean of CA15-3 antigen in serum of groups under study

Breast cancer is the most common type of cancer and one of the most common causes of mortality among females worldwide. Therefore, it is a major concern for scientists and doctors. Therefore, several diagnostic markers were found to help in the early diagnosis of breast cancer and the estimation of important predictive factors, including cancer antigen (CA15-3), as Mohammed et al. [13] showed that patients with breast cancer had increased levels of CA15-3. The results of the current study coincide with those of Hamdi et al. [14] and Feng et al. [15], who indicated that the tumour marker CA15-3 is abnormally high in women with breast cancer, indicating a chance of disease progression or recurrence. CA15-3 screening is one of the key requirements for diagnosing breast cancer. When a change occurs in CA15-3, these changes are reflected in the condition of the disease as tumor markers are used in clinical practice, it will lead to more effective treatment. CA15-3 is a marker with high specificity and moderate sensitivity of distant malignancy in breast cancer. Therefore, most research has indicated that it is considered an important diagnostic biochemical marker for breast cancer patients [16, 176]

On the other hand, the results showed a decrease in the level of CA15-3 in patients with breast cancer as a result of taking treatment, as Perrier et al. [18] indicated that breast cancer patients had a significant decrease of (> 10%) in CA15-3 levels in the first month of treatment, therefore, measurements of CA15-3 during the treatment period may prove that it is useful for monitoring treatments and predicting disease progression, and this is consistent with the results of the current study.

Urea level in serum:

Table (1) shows that the mean± standard deviation of the antigen level was (32.398±1.280) mg/dL in G1 and (45.008±9.388) mg/dL in G2 compared to (31.249±0.711) mg/dL in healthy women. The results of the urea level showed that there were no significant differences in the urea level between the G1 group and healthy women, while a significant increase was observed in the G2 group compared to the G1 group and healthy women and at the probability level ($P \leq 0.05$), as in Figure (2).

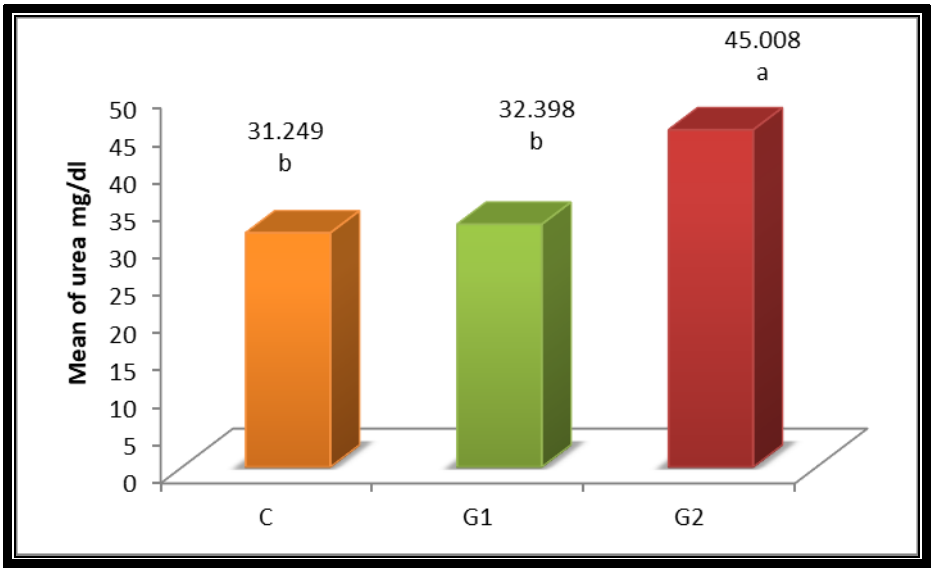

Figure (2): mean of urea in the blood serum of groups under study

The results of the current study are consistent with those of AL- Hussein [19], Chauhan et al. [20]whose results showed a significant rise in the concentration of urea in breast cancer compared to healthy and urea is important chemical parameter for cancer monitering, also the results of the current study agreed with Nandhini et al. [21] and Devi et al. [22] who indicated that there was no difference in urea concentrations when comparing women with breast cancer with healthy people where they are within the normal range, as shown by the results of the study Abou Zaid et al. [23] a small increase in urea concentration in the affected group compared to the healthy group.

Cancer patients often suffer from pre-existing comorbidities or other risk factors that increase the likelihood of developing renal impairment before receiving treatments that may be toxic to the kidneys [24] chronic kidney disease is common in most elderly people in general, regardless of the presence of cancer [25]. The reason for the increase in urea in group G2 compared to group G1 and healthy cells can be caused by an increase in the metabolism of cellular proteins resulting from an increase in the destruction of cancer cells and some healthy cells as a result of chemotherapy.

Serum creatinine level:

Table (3) shows that the mean± standard deviation of creatinine level was (0.790±0.049) mg/dL in patients of the first group G1 and (1.307±0.355) mg/dL in patients of the second group G2 compared to (0.744±0.029) mg/dL in healthy women. The results showed that there were no significant differences in the level of creatinine between the G1 group and the healthy ones, while a significant increase was observed

in the G2 group compared to the G1 group and the healthy and at the probability level (P≤0.05), as shown in Figure (3).

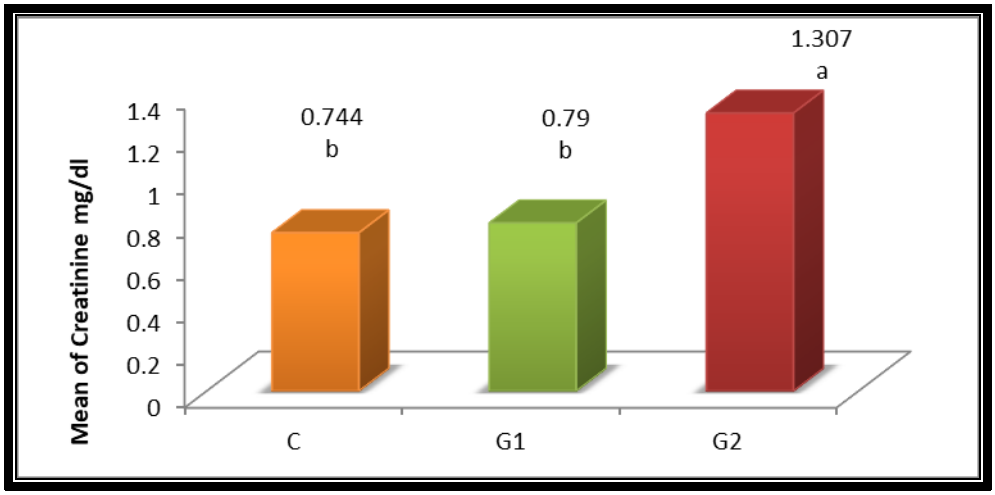

Figure (3): mean of creatinine in the blood serum of the samples under study

The study's results agreed with the results of Al-Dulaimi [26], who indicated that there were no significant differences in the level of creatinine in serum of breast cancer patients compared to healthy women. The results of the current study are agree with Chauhan and his group [20] who showed that creatinine levels are within the normal range in breast cancer patients and healthy people, and the results of the current study are not consistent with a study conducted in Salahuddin governorate in Iraq by Al-Hussein [19] and the study of Devi et al. [21] conducted in India, and their results showed that creatinine levels rise in women with breast cancer compared to healthy women.

The reason for the difference between creatine levels in women with breast cancer compared to healthy is Organic Cation Transporter 2 (OCT2), which is the primary substance found in OCT2 to reduce the secretion of creatinine in the kidneys which indicates renal insufficiency [27]. The human organic cation transporter OCT2, which is specifically expressed in the kidneys, plays important roles in the renal excretion of cationic compounds, tissue expression and membrane localization of OCT2 is closely related to tissue distribution and adverse pharmacological effects [28], and since our results showed creatinine within the normal mean, this means that kidney permeability works properly and not affected, and laboratory studies have shown that ribocicilib drug inhibits organic cation-2 (OCT2) trans mechanisms of competitive change at doses used in clinical practice [29].

while for the G2 group, the increase in creatinine levels may be due to the kidneys being affected by chemotherapy, which led to high creatinine levels in the serum of breast cancer women in this group.

تقييمCA15-3 ، يوريا الدم والكرياتينين في سرطان الثدي

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الخلاصة:

أجريت الدراسة الحالية على 90 امرأة مقسمة إلى ثلاث مجموعات: G1 ضمت 30 امرأة مصابة بسرطان الثدي، وG2 ضمت 30 امرأة مصابة بسرطان الثدي تلقين جرعة واحدة من العلاج و30 امرأة كمجموعة ضابطة (أصحاء)، أعمارهن وتراوحت المجموعات ما بين (27-25) سنة، حيث تم جمع العينات من مستشفى الأورام التابع لمدينة الطب في محافظة بغداد، للمدة ما بين 2022/11/1 الى 2023/2/1 حيث حوالي 5 مل من الدم تم جمع العينات من دماء مجموعات المرضى وكذلك من النساء الأصحاء وتم تقسيم العينات على أساس نوع الاختبار، بعد وضعها في أنابيب هلامية خالية من مضادات التخثر وترك الدم عند درجة حرارة 25 درجة مئوية حتى يصبح يتخثر ثم يوضع في جهاز طرد مركزي لمدة 10 دقائق بسرعة 3000 دورة/دقيقة ومن ثم يتم الحصول على المصل ثم يوضع في إيبندورف ويحفظ في الفريزر العميق عند درجة حرارة -20 درجة مئوية لغرض قياس مستويات CA15-3 اليوريا والكرياتينين في النساء المصابات بسرطان الثدي.

أظهرت نتائج البحث الحالي ارتفاعاً معنوياً في المستضد السرطاني CA15-3 في مصل G1 وG2 مقارنة بمجموعة السيطرة مع انخفاض معنوي في مجموعة G2 مقارنة بـ G1، بينما أظهرت اليوريا والكرياتينين ارتفاعاً معنوياً. في مصل G2 مقارنة بـ G1 والنساء الأصحاء.

References

1-Ferlay, J., Soerjomataram, I., Ervik, M., Dikshit, S., Eser, C., Mathers, M., & Bray, F. cancer incidence and mortality worldwide: IARC Cancer Base. Lyon, France: International Agency for Research on Cancer. 2012; 1. (11).

2-FERLAY, J. S. E. M., et al. Globocan Cancer incidence and mortality worldwide: IARC CancerBase, 2013, 11.

3. Yadav AR, Mohite SK. Cancer-A silent killer: An overview. Asian Journal of Pharmaceutical Research. 2020;10(3):213-6.

4. Ministry of Health and Inviroment,Iraqi Cancer Board. Annual Report Iraqi Cancer Registry 2018.

5- Maric, P.; Ozretic, P.; Levanat, S. et al. Tumor markers in breast cancer-evaluation of their clinical usefulness. Coll Antropol. 2011;35(1):241-7.

6- Tondini, C.; Hayes, D.F. and Gelman, R. Use of various epithelial tumor marker and stromal marker in assessment of cervical carcinoma obstet. J. Gynecol. 1991; 77:566.

7-Matsue, Y., van der Meer, P., Damman, K., et al . Blood urea nitrogen-to-creatinine ratio in the general population and in patients with acute heart failure. Heart 2017; 103: 407–413.

8-Qian, H., Tang, C., Yan, G., Predictive value of blood urea nitrogen/creatinine ratio in the long-term prognosis of patients with acute myocardial infarction complicated with acute heart failure. Medicine (Baltimore). Medicine (Baltimore). 2019;98(11): 14845.

9-Maroni B, Steinman T, Mitch W. A method for estimating nitrogen intake of patients with chronic renal failure. Kidney Int. 1985;27:58-65.

10-Miltuninovic J, Cutler R, Hoover P, Meijsen B, Scribner B. Measurement of residual glomerular filtration rate in the patient receiving repetitive hemodialysis. Kidney Int. 1975;8:185-190.

11-Chaney, A.L., and Marbach, E.P. Clin. Chem. 1962; 8 : 132.

12- Jaffe, M.Z. Physiol. Chem. 1886;10 : 391.

13-F. Z. Mohammed , Lamis Gamal , Mohamed Farouk Mosa, Mohamed Ibraheim Aref .Assessment of CA15-3 and CEA as Potential markers for Breast carcinoma prognosis in Egyptian Females. AJBAS Volume 2, Issue 1, 2021.

14- Hamdi .E. T , Alsamarai A.T, Ali . A.A . The relationship between vitamin D with breast Cancer. Medical Science. 24(104).2020.

15-Feng, Z.; Li, J.; Liu, L.; Wang, X.; Huang, Y.; Dai, H. et al. Tumor markers CA15-3, CA125, CEA and breast cancer survival by molecular subtype: a cohort study. Breast Cancer2020; 1-10.

-Braihan Hamdi Hameed 1*, Izzat Abdulsatar Al-Rayahi1, Salwa S. Muhsin218-16

Evaluation of Preoperative CA15-3 Level and its Relationship with Clinico-Pathological Characteristics in Primary Breast Cancer Patients Journal of Techniques, ISSN: 2708-8383, Vol. 4, No. 2, June 30, 2022, Pages 21-26.

17-Huda Hameed Othman(MBChB) 1 , Walaa Najm Abood (PhD) 2 and Nazar Abdul Hassan Alwakeel (FICM) The level of serum Tumor Marker CA15-3 in women with Breast Cancer. Diyala Journal of Medicine. 2018; 15 1 .

18-Perrier, A.; Boelle, P. Y.; Chrétien, Y.; Gligorov, J.; Lotz, J. P.; Brault, D. et al. An updated evaluation of serum sHER2, CA15. 3, and CEA levels as biomarkers for the response of patients with metastatic breast cancer to trastuzumab-based therapies. Plos one 2020;15(1), e0227356.

19-AL- Hussein, Saja Abdul-Qader Hussein, Evaluation of the Serum Levels of Alanine Aminopeptidase and Aggrecan with Some Biochemical Parameters in Women with Breast Cancer, Degree of Master, Tikrit University, College of Medicine. 2019.

20-Chauhan P, Yadav R, Kaushal V, Beniwal P. Evaluation of serum biochemical profile of breast cancer patients. Int J Med Res Health Sci. 2016;5(7):1.

21-NANDHINI, Thasleema; PRIYA, Jothi; DEVI, R. Gayatri. Biochemical evaluation of patients with breast cancer. Drug Invention Today, 2019, 11.8

22-Devi LI, Ralte L, Ali MA. Serum biochemical profile of breast cancer patients. European Journal of Pharmaceutical and Medical Research. 2015;2(6):210-4.

23-Abou Zaid OA, Ahmed FA, Badwi AF, Ibrahim NM. Effect of natural nanoparticles products on hepato-renal functions in breast carcinoma female rats. Benha Veterinary Medical Journal. 2017;33(2):99-106.

24-Aapro M, Launay-Vacher V. Importance of monitoring renal function in patients with cancer. Cancer treatment reviews. 2012;38(3):235-40.

25-Stevens LA, Li S, Wang C, Huang C, Becker BN, Bomback AS, Brown WW, Burrows NR, Jurkovitz CT, McFarlane SI, Norris KC. Prevalence of CKD and comorbid illness in elderly patients in the United States: results from the Kidney Early Evaluation Program (KEEP). American Journal of Kidney Diseases. 2010;55(3):S23-33.

26- Al-Dulaimi. Maadam Khamis Abdul. Evaluating the intercine -6 level and the alpha tumor necrosis factor with some cumulative indicators in women with breast cancer. Master Thesis . Samarra University. College of Education. 2021.

27-Stabuc B, rhovec L, tabuc- ilih M, Cizej TE. Improved prediction of decreased creatinine clearance by serum cystatin C: use in cancer patients before and during chemotherapy. Clinical chemistry. 2000;46(2):193-7.

28-Aoki M, Terada T, Kajiwara M, Ogasawara K, Ikai I, Ogawa O, Katsura T, Inui KI. Kidney-specific expression of human organic cation transporter 2 (OCT2/SLC22A2) is regulated by DNA methylation. American Journal of Physiology-Renal Physiology. 2008;295(1):F165-70. 234.

29-Pabla N, Gibson AA, Buege M, Ong SS, Li L, Hu S, Du G, Sprowl JA, Vasilyeva A, Janke LJ, Schlatter E. Mitigation of acute kidney injury by cell-cycle inhibitors that suppress both CDK4/6 and OCT2 functions. Proceedings of the National Academy of Sciences. 2015;112(16):5231-6.