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Caspase-3, liver function test and trace elements in Iraqi women with breast cancer

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Abstract--Introduction: Cancer is a class of diseases characterized by out-of-control cell growth. Breast cancer is most common disease among women. Aim: The aim of this study to investigate Caspase-3, liver enzyme and trace elements (Iron, magnesium and phosphorus) in women whose suffered from breast cancer. Materials and Methods: Three groups of Iraqi women were chosen named group I (50 healthy women), group II (32 patients new diagnosed with breast cancer and do not take chemotherapy) and group III (43 patients have taken chemotherapy). From the results, On the other hand, the study have been measurement of some biochemical variables, including caspase-3 enzyme, liver enzymes (ALT, AST, ALP) and measuring important trace elements that may have an effect on breast cancer, which included (magnesium, iron and phosphorous). Results: The results showed a significant decrease ($P<0.05$) between group I and group II in both magnesium and ALT. There was a significant decrease between the group I and the group III in magnesium and a significant increase ($P<0.05$) between the group I and the group II in iron. In addition, AST and iron levels increased significantly between groups I and III. Furthermore, there were non-significant differences between groups I and II regarding AST, ALT, caspase 3, and phosphorus. Additionally, there were non-significant differences between groups I and III regarding caspase 3, phosphorous, ALT, and ALP.

Keywords--caspase-3, breast cancer, trace elements, statistical analysis.

Introduction

Cancer is a group of diseases are defined by unregulated cell proliferation. [1]. at the end of 2020, ten million people died because of cancer, reaching 19.3 million new cancer cases world wide[10a16]. Breast tissue, namely the inner lining of milk ducts or the lobules that must supply the ducts with milk, is where breast cancer typically develops [2]. Furthermore, for the first time, female breast cancer overtook lung cancer as the malignancy with the greatest number of diagnoses. Cancer continues to be a major public health issue due to the rising incidence and death [1]. Breast cancer possess a serious threat to women's health in Iraq, according to several publications. This is especially true in recent years [3], family history of the disease[4] Nulliparity, taking oral contraceptives, hormone replacement treatment, inactivity, are the most common breast cancer risk factors.[3]. Early identification of breast cancer is critical in effectively lowering female mortality caused by breast cancer. In the last years there are many cases which diagnosis with breast cancer in Iraqi society. Thus, this study will focuses on investigation in biochemical parameters for women groups who have malignant Breast cancer in Iraq which may concenter as Diagnostic and Prognostic Markers in patients with breast cancer.

Material and Research Methods

The study is approved by the medical ethics committee of Iraqi Ministry of Health. The samples have been collected from 115 patient women (Oncology teaching Hospital of Medical City and Hewa Hospital in As-sulymania during the period from June 2021 to October 2021). These samples have been divided into three groups Group II includes 30 new diagnosed cases with breast cancer. group III includes 35 chemotherapeutic cases and the group I includes 50 healthy women.as contrast groups the cases were diagnosed by the consultant medical team at the hospital through diagnostic criteria, the diagnostic was made according to clinical, mamografical and histological findings. The age for selected cases including the control group was ranging between (20 - 70). Three milliliters of peripheral blood had been drawn from each case, then put in gel tube and kept serum deep freeze (-20°C) until used. The determination of CASPASE 3 was done depending on the method provided by ELISA Reader & washer (Bio tech (USA). The activity of Alkaline Phosphatase, alanine transaminase and aspartate transaminase were determined using full automated machine type cobas c311. Serum Iron, inorganic phosphorus and magnesium were determined using Huuman's manufactured kit and the colorimetric method. (Germany).

Results and Discussion

Levels of caspase 3

The levels of caspase 3 were measured in group I, II and III, and figure 1 indicates the mean± SE of these groups

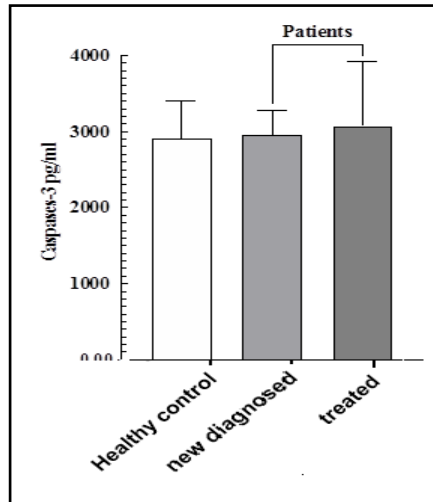


Figure 1. Caspase 3 Levels in group I, II and III

The findings reveal that the level of caspase 3 for group I, II and III, are 2910 pg/ml, 2955 pg/ml and 3068 pg/ml respectively, these values considered as a non-significant compared to control group. Increased caspase-3 activity is typically seen as an indication of apoptosis and a good sign of cancer therapy effectiveness[5]. Our results indicated that the level of caspases-3 in group II and group III were non-significant change compared to group I, the results reported that non-significant change in group II compared with group III

Levels of ALT

Figure 2 shows the levels of ALT in studies groups. The values of ALT in groups I,II and III of the mean were 18.2, 15.8 and 18.9 respectively, these values considered as a non-significant compared to control group.

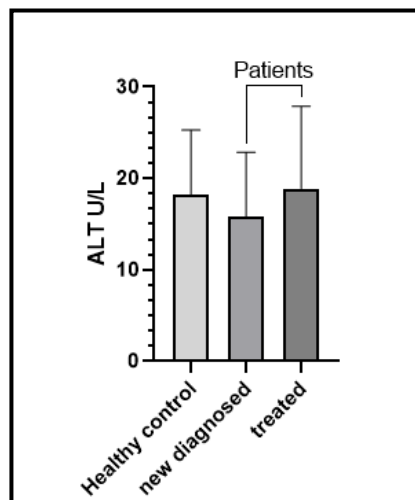


Figure 2. ALT Levels in group I, II and III

The results indicated that the level of ALT in group II and group III were non-significant change compared to group I. The results reported that non-significant change in group II compared with group III.

Levels of AST

The levels of AST were measured in group III, I and II, and figure 3 indicate the mean \pm SE for these groups.

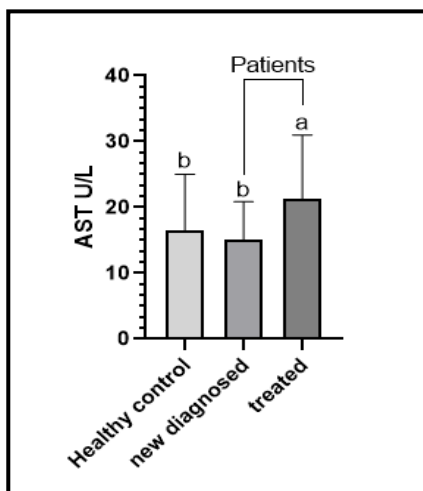


Figure 3. AST Levels in group I,II and III

The mean for group I, II and III were 16.5, 15.1 and 21.2 IU/L respectively. Aspartate aminotransferase is considered to be a sensitive marker of hepatotoxicity and liver injury[6] and many other diseases [7][8][9]. The results indicated that the level of AST in group II were not significant change compared with group I, Our findings agree with Kamal at el [10] as they found no significant change in serum AST level in women with cancer who did not receive chemotherapy compared to controls[10]. In another hand that the results reported that significant increase in group III compared with group I and group II. it may produce from many side effects such as hepatotoxicity[11], activities which explained by accumulation of drug in the liver, with cell destruction, toxic side effects and increased permeability of liver cell [12].

Levels of ALP

The levels of were measured in group III, I and II. Figure 4 indicate the mean \pm SE for these groups.

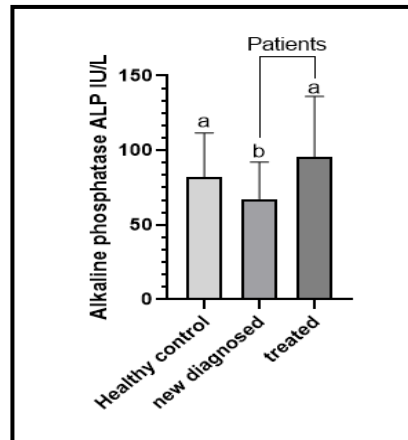


Figure 4. ALP Levels in group I,II and III

The findings revealed that The mean level of ALP for group I, II and III IU/L were 82.2, 67.4 and 95.3 respectively. Alkaline phosphatase (ALP) is frequently evaluated in clinical settings as a sign of hepatic or bone illness [13], and many other diseases [29]. The results indicated that the level of ALP in group II were significant decrease compared to group I, Our findings disagree with Mohamed [15] indicated that the activity of enzyme in no treatment patient was significantly increased ($p \leq 0.01$) compared with control [15]. On another hand that the results reported that non-significant change in group III compared to group I, Our findings differed with El-Beshbishya et al [16] appeared the high doses of tamoxifen consider toxic and cause hepatotoxicity and increases ALP in rates but this not approved on the human [16].

Levels of Trace Element

The level of magnesium were measured in group III, I and II, and the figure 4 indicate the mean \pm SE.

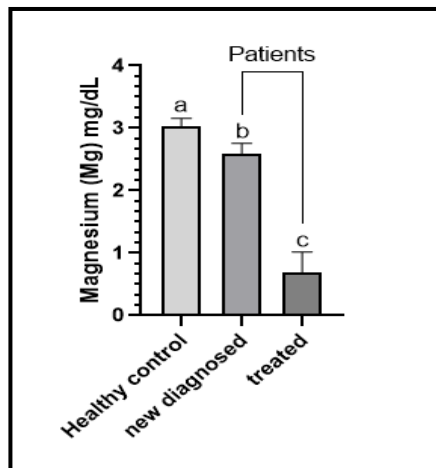


Figure 5. Magnesium Levels in group I, II and III

The mean level of magnesium for group I, II and III were 3.03mg/dl, 2.58 mg/dl and 0.685 mg/dl respectively. The result indicated that the level of magnesium in group II is significantly decreased compared to group I but it is in the normal range, our results agreed with Daila et al [17]. Mechanism in connection with the decrease magnesium may have an impact on how breast cancer develops since low blood levels of this mineral appear to affect various systems that control cellular death, differentiation, and proliferation [18]. One such instance is a decrease in the function of the tumor suppressor gene-encoded protein p53, which promotes the activation of protein tyrosine kinases and hence suppresses apoptosis [18][19].

However group III was significant decrease compared with group I and out of the range, this finding agreed with another previous research of patients with breast cancer receiving chemotherapy [20]. Anticancer medications, in particular, produce hypomagnesemia in cancer patients in addition to the impact of cancer on magnesium [21]. Therapy with cytotoxic medications may inhibit the reabsorption of magnesium by the renal tubules, which results in its loss in urine [22]. This explains the result that Tietz obtained from increasing the urinary magnesium ratio in women diagnosed with breast cancer higher than normal, with a statistically significant difference between the groups [23]. Iron The level of iron were measured in group III, I and II, and the figure 6 indicate the mean \pm SE.

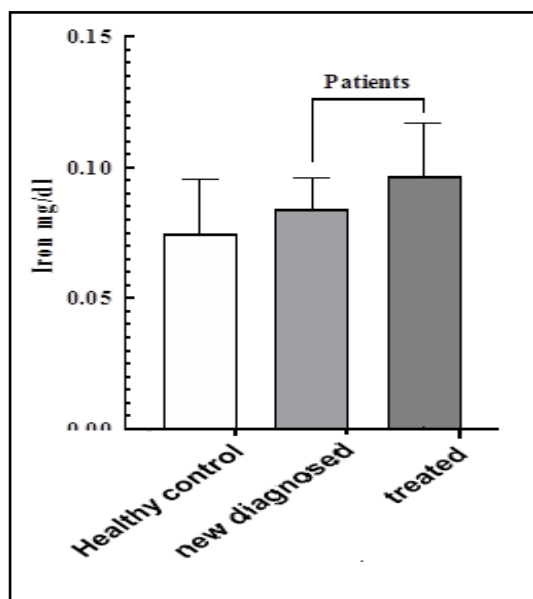


Figure 6. Iron Levels in group I, II and III

For I,II and III groups the levels of iron were 0.0746 mg/d, 0.0843 mg/d and 0.0967 mg/dl respectively. The critical role of iron in many physiological and metabolic processes means that any disruption of iron homeostasis may lead to the emergence of chronic illnesses like breast cancer [24]. Our study have been show the significant increase of level of serum iron in group II and III that agree with John et al [25]. When compared to the control group, it was discovered that

the cancer samples had a significantly significant iron buildup ($p < 0.0001$) [25] and they were reported by Chi Pang et al. According to this study, high blood iron levels are both a frequent condition and a sign of an elevated risk for a number of malignancies [26] phosphorus. The level of phosphorus were measured in group I, II and III and figure 7 indicate the mean \pm SE.

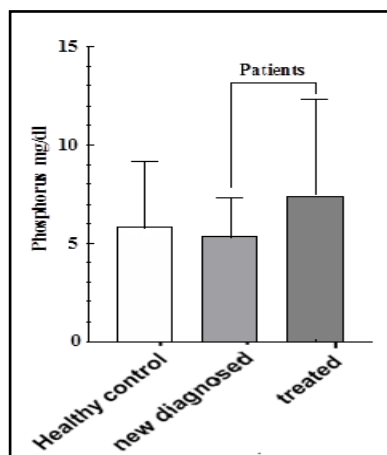


Figure 7. Phosphorus Levels in group I, II and III

The mean for group I, II and III of the phosphorus were 5.86 mg/dl, 5.38 mg/dl and 7.45mg/dl respectively. The results indicated that the level of phosphorus in group II and group III were non-significant change compared to group I, addition the results reported that non-significant change in group II compared with group III.

Conclusion

There is no effect of the number of doses on any of the biochemical parameters of the sample under study, good a marker of magnesium to prognosis of occur of breast cancer.

Conflicts of interest

The author declare no conflict of interest.

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