Study of the correlation between CA15-3 and each of prolactin hormone and lactate dehydrogenase enzyme in women with breast cancer in THI – QAR governorate – Iraq

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ABSTRACT

The most malicious tumor in women is breast cancer. Its treatment at the early stage of its recognition in a woman provides her multiple options for diagnosis. Physical inspection and mammography are helpful screening processes for the primary recognition of breast cancer, they are also labor dependent and need health specialists who are exceptionally prepared and skilled. This experiment was designed to estimate and compare the CA15-3 level, Prolactin hormone, and Lactate dehydrogenase enzyme in Breast Cancer patients and in apparently healthier individuals. Blood CA15-3, Prolactin hormone, and Lactate dehydrogenase enzyme levels were determined in 65 Women with Breast Cancer and 55 apparently healthy subjects. The levels of serum CA15-3, Prolactin hormone, and Lactate dehydrogenase enzyme were showing a significant increase in women with Breast Cancer in comparison to the control group (P ≤ 0.05). The study also investigates the correlation between the concentrations of the CA15-3 and each of Prolactin hormone, and Lactate dehydrogenase enzyme, However, we compared all measurement parameters according to the type of disease. In Breast cancer patients, we finding increase CA15-3, Prolactin hormone, and Lactate dehydrogenase enzyme can clearly occur, and we finding positive correlation relationship between CA15-3 and each of PRL and LDH through coefficient correlation (r).

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INTRODUCTION

One of the most precarious tumors that is found in women is breast cancer (DeSantis et al., 2011a). The recognition and diagnosis of this type of cancer at the primary phase give a woman more options in the choice of treatment. Mammography and physical examination are said to be the best processes for the recognition of breast cancer, but they have some disadvantages such as labor dependence and requirement for highly trained health professionals. Serum tumor marker detection and immunohistochemistry are employed for assessing breast carcinoma. The tumor marker procedure may be employed for treatment (early identification and differential diagnosis), prognostic assessment and growth (therapeutic monitoring) (Robles-Frías et al., 2005).

American Joint Committee on Cancer (AJCC) has created a staging method known as TNM (tumor, nodes, and metastasis) system. It states that the tumor size relates to the existence of axillary lymph node metastases. A mucin that is CA 15-3 belongs to a huge group of glycoprotein. It is encoded by MUC1 gene, raised pre-operative. CA 15-3 level belongs to independent
prognostic and tumor burden factors for breast cancer. They can be allowed for clinical use such as defining adjuvant treatment for improved results and forecasting patient outcome (Yang et al., 2007). CA 15-3 is allowed to be employed in combination with physical examination and diagnostic imaging and history. CA 15-3 determination is particularly helpful for assessing the recurrence of sickness and reply to diagnosis (Harris et al., 2007). The cells of lactotroph of the front lobe of the pituitary gland (the adenohypophysis) create a neuroendocrine polypeptide hormone that is Prolactin (PRL). It also produces other tissues, for example, lymphocytes, the mammary gland, uterus, placental decidua, and prostate. The prolactin receptors mediate the operations of PRL. Physiologically, epithelial cell proliferation, DNA synthesis, and breast milk production are stimulated by PRL (Rahman et al., 2014). The rising epidemiological and experimental proof indicates the function of PRL in breast tumorigenesis. It is alike to the development of normal mammary gland. The process of breast carcinogenesis is usually hormonally dependent (Lee and Ormandy, 2012).

The anaerobic glycolysis is done by Serum Lactate dehydrogenase (LDH). The level of LDH in the cytoplasmic compartment of cells is modulated by a sharp rise in the number of malignant cells. This ultimately gives rise to serum LDH level in the patients of breast cancer. The requirement of anaerobic and metabolic glycolysis of the malignant cells is done by the increased level of LDH. The serum LDH value is noticed to be specific in breast cancer patients. This also resembles clinical TNM staging (Koukourakis et al., 2009). The enhanced level of LDH indicates these changes and recommends more serious tumor angiogenesis, tumor progression conditions, and tumor burden. All of this causes the poor expectancy of malignant tumors (Kolev et al., 2008).

RESULTS AND DISCUSSION

In this work, we determined the effect of this disease on the CA15-3, Prolactin hormone (PRL), and Lactate dehydrogenase enzyme (LDH).

CA15-3, Prolactin hormone (PRL), and Lactate dehydrogenase enzyme (LDH) were showing a significant increase in the patients of Breast cancer in comparison to the control group. The relation of the concentrations of PRL and LDH with CA15-3 was also studied in this experiment. However, we compared all measurement parameters for disease group.

Table 1: Serum CA15-3 concentrations of (control) and (breast cancer) groups

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>CA15-3 concentration (U/mL) mean± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>control</td>
<td>5</td>
<td>12.32±3.68b</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast cancer</td>
<td>65</td>
<td>345.13±41.91a</td>
</tr>
<tr>
<td>LSD</td>
<td></td>
<td>3.91</td>
</tr>
</tbody>
</table>

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. LSD: Least Significant Difference.
Correlation relationship between the concentrations of CA15-3 and each of PRL and LDH.

**Figure 1**: indicate a positive relation among PRL and CA15-3 in the breast cancer group. The coefficient correlation is \( r = 0.32 \).

**Figure 2**: indicate a positive relation among LDH and CA15-3 in the breast cancer group. The coefficient correlation is \( r = 0.34 \).

One of the most dangerous cancers in the world is breast cancer. It is considered as the 2nd most fatal distortion (DeSantis et al., 2011b,c).

The greater CA 15.3 value indicates poor result and a greater burden of occult sickness. The greater concentration of CA 15.3 indicates the worst prediction in patients of breast cancer. This is an alarming factor of the first repetition in patients having advanced breast cancer (Begum et al., 2012).

According to Berruti et al., the occurrence of a higher level of CA 15-3 is different from the site of metastasis (Berruti et al., 1994).

Lee et al. indicates that the higher levels of tumor marker are found more in metastatic breast cancer patients in contrast to the primary breast cancer patients and also compared to patients with higher levels of tumor marker prior to surgery (J.S. et al., 2013).

The normal measurement of levels of serum tumor marker gives valuable data for earlier recognition of recurrence because markers are comparatively easy and cheap to measure (Gioia et al., 2011) (Laessig et al., 2007).

The studies that are focused on the relation among the risks of breast cancer and levels of PRL are usually concentrated on circulating PRL levels. Nevertheless, in addition to operating in an endocrine manner, PRL also works in an paracrine/autocrine [i.e. the locally created PRL by mammary cells have an impact on autocrine cell or nearby paracrine cells] (Ben-Jonathan et al., 2002) (Clevenger et al., 2003) (Muthuswamy, 2012).

The past studies indicate that prolactin has a great part in the growth of breast cancer because of inhibiting apoptosis and inducing cell proliferation (Jacobson et al., 2011). Moreover, prolactin also works to improve cell migration and angiogenesis. This expressively causes cancer metastases (Struman et al., 1999).

In comparison, all the verified researches were combined in this study to make a large sample size. This helped to gain more consistent results with higher statistical power. This strategy helped to reveal a
positive relationship among breast cancer risks and plasma prolactin levels.

Further investigation pointed out that prolactin may be the source of breast cancer in addition to acting as a biomarker.

The levels of serum LDH were determined to be greater in breast malignancy patients, and this is also related to the bulk of the tumor and clinical stage (Radenkovic et al., 2013). These same results were presented by past studies (P. et al., 1990).

CONCLUSION

The data provided in this study helped to reach the below conclusion:

In breast cancer patients, we found increase CA15-3, Prolactin hormone, and Lactate dehydrogenase enzyme can clearly occur, and a positive relationship between CA15-3 and each of PRL and LDH was found through coefficient correlation (r).

REFERENCES


