

ASSESSMENT OF THE ACTIVITY OF LACTATE DEHYDROGENASE, GAMMA GLUTAMYL TRANSPEPTIDASE AND ALKALINE PHOSPHATASE IN CARCINOMA BREASTZahra A. Ahmed*¹, Abd Elkareem A. Rabo¹, Nagla Abdalhafez Mohamed² and Asaad Ma. Babker³¹Department of Clinical Chemistry, Faculty of Medical Laboratory Sciences, University of Al-Neelain, Khartoum, Sudan.²Department of Clinical Hematology, Faculty of Medical Laboratory Sciences, University of Shendi, Shendi, Sudan.³Department of Medical Laboratory Sciences, College of Health Sciences, Gulf Medical University, Ajman, UAE.***Corresponding Author: Zahra A. Ahmed**

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ABSTRACT

Background: Breast cancer is the second most common cancer worldwide after lung cancer, the fifth most common cause of cancer death, and the leading cause of cancer death in women. The global burden of breast cancer exceeds all other cancers and the incidence rates of breast cancer are increasing for the early detection of carcinoma of breast, several biochemical markers have been studied to evaluate the malignancy. **Aims and Objectives:** To study the activity of LDH, GGT and ALP in carcinoma breast and to evaluate whether their levels are significantly higher in breast cancer as compared to normal value. **Material and method:** Fifty women diagnosed with breast cancer were involved in this cross-sectional study, they were attended to Khartoum oncology hospital for diagnosis, treatment and follow up. They were grade I, II and III. Approval of study to be performed was obtained from each patient and hospital administration as well. Under hygienic condition blood withdrawn in plane containers from each subject considering labeling and data obtained from each one, blood allowed for clot formation and subsequent serum separation which preserved at -20 °C for later chemical analysis. Chemical analysis targeted enzymes, GGT, LDH and ALP, they measured by means of spectrophotometer method, using Biosystem device, reagents were Biosystem trademark, they were ready to use. **Result:** This study conducted in concern of breast cancer, it involved 50 women with established diagnosis, the Mean \pm SD duration of the disease was (3.52+1.89) years and their age Mean \pm SD was (38.1+6.31) year's. They were enrolled in the measurement of GGT, LDH and ALP. Comparing the levels of measured parameters with normal value for each one, brought significant difference for LDH and ALP but no difference obtained for GGT. Enzymes level among the three grades of breast cancer brought significant difference for LDH at grade II and III as p values 0.022 and 0.001 respectively, ALP did not bring any difference among the three grades while GGT has only significant difference at grade III as p value 0.022. **Conclusion:** The present observational study has shown a significant elevation in serum levels of LDH and GGT in cases of carcinoma Breast while ALP did not bring any significant and suggest that the estimation of LDH and GGT can be used as routine screening tests in all suspected carcinoma breast patients.

KEYWORD: LDH, GGT, ALP, Breast Cancer.**INTRODUCTION**

Breast cancer continues to be a disease with tremendous public health significance.^[1] It remains the leading cause of cancer mortality for women in both developed countries (30%) and developing countries (14%)^[2] where its incidence rates have been continuously rising.^[3] It is a disease characterized by prevalence, aggressiveness, unequal geographic distribution, and an increasing incidence throughout the world.^[4-5] Many experimental, clinical and epidemiological studies have revealed that several factors influence breast cancer etiology. Hormonal factors^[6-7], reproductive factors, genetic factors, lifestyle, and dietary factors.^[8]

Lactate dehydrogenase (LDH) is the enzyme responsible for the conversion of pyruvate to lactate during glycolysis.^[9] It is expressed in all tissues and its A and B subunits, coded by two different genes LDH-A and LDH-B, combine to construct five iso-enzymes (LDH1 to LDH5) with selective distribution among tissues and in serum.^[10] Elevated LDH levels are seen in cancer patients, and its prognostic value has been shown in several malignancies such as germ cell tumors, lymphoma, melanoma and renal cell carcinoma.^[11-12]

Gamma-glutamyltransferase (GGT) is a cell-membrane bound enzyme^[13], GGT is responsible for the glutathione

(GSH) metabolism, catalyzing the degradation of extracellular GSH and further promoting amino-acid recovery for subsequent intracellular GSH synthesis.^[14] Intracellular GSH acts as an antioxidant, neutralizing free radicals and so plays a decisive role in protection against oxidative stress during cell metabolism. Therefore, GGT and GSH are increasing in circumstances of oxidative stress like carcinogenesis.^[15]

Alkaline phosphatases are a group of phosphatidylinositol-anchored membrane proteins with wide substrate specificity.^[16-17] It comprises a group of enzymes that catalyze the hydrolysis of phosphate esters in an alkaline environment, generating an organic radical and inorganic phosphate.^[18] An increase in serum ALP levels is frequently associated with a variety of diseases such as extrahepatic bile obstruction, intrahepatic cholestasis, infiltrative liver disease, hepatitis and cancer.^[19] However, analysis of the assessment of activity for lactate dehydrogenase, Gamma glutamyl transpeptidase and alkaline phosphatase in breast cancer has not yet been clear till now and many studies have tried to evaluate role of tumor markers in diagnosis of carcinoma breast. In view of our present study was undertaken to study the present study activity of lactate dehydrogenase, Gamma glutamyl transpeptidase and alkaline phosphatase among Sudanese women with breast cancer.

MATERIAL AND METHOD

The present cross-sectional study was undertaken to determine biochemical changes in 50 carcinoma breast

cases, they were attended to Khartoum oncology hospital for diagnosis, treatment and follow up. They were grade I, II and III. Approval of study to be performed was obtained from each patient and hospital administration as well. Under hygienic condition blood withdrawn in plane containers from each subject considering labeling and data obtained from each one, blood allowed for clot formation and subsequent serum separation which preserved at -20 °C for later chemical analysis. Chemical analysis targeted enzymes, GGT, LDH and ALP, they measured by means of spectrophotometer method, using Biosystem device, reagents were Biosystem trademark, they were ready to use.

RESULT

This study conducted in concern of breast cancer, it involved 50 women with established diagnosis, the Mean±SD duration of the disease was (3.52±1.89) years and their age Mean±SD was (38.1±6.31) years (Table - 1). They were enrolled in the measurement of GGT, LDH and ALP. Comparing the levels of measured parameters with normal value for each one, brought significant difference for LDH and ALP but no difference obtained for GGT (Table -2). Enzymes level among the three grades of breast cancer brought significant difference for LDH at grade II and III as p values 0.022 and 0.001 respectively, ALP did not bring any difference among the three grades while GGT has only significant difference at grade III as p value 0.022 (Table -3).

Table 1: Age And Duration of Breast Cancer.

Parameters	Minimum	Maximum	Mean±SD
Age (Years)	26.00	49.00	38.10±6.31
Duration (Years)	1.00	8.00	3.52±1.89

Table 2: Mean±SD of APL, GGT and LDH Among Breast Cancer Women.

Parameters	Mean±SD	Mean (Normal Value)	P-value
LDH (U/L)	193.50±54.54	337.5 (225-450)	0.000
ALP (U/L)	63.52±20.88	70 (42-98)	0.036
GGT (U/L)	38.56±16.39	41 (34-48)	0.298

Significant difference as p Value <0.05

Table 3: LDH, ALP and GGT Among the Three Grades of Breast Cancer.

Parameter	Grade I (Mean±SD)	Grade II (Mean±SD)	Grade III (Mean±SD)
LDH (U/L)	128.66±14.04	186.00±42.28	204.86±59.14
P-value	0.298	0.022	0.001
ALP (U/L)	65.33±5.50	62.44±23.57	67.44±20.33
P-value	0.298	0.234	0.112
GGT (U/L)	28.66±13.31	34.27±12.06	42.24±18.24
P-value	0.298	0.324	0.022

Significant difference as p Value <0.05

DISCUSSION

Breast cancer is the second most common cancer worldwide after lung cancer, the fifth most common cause of cancer death, and the leading cause of cancer

death in women. The global burden of breast cancer exceeds all other cancers and the incidence rates of breast cancer are increasing.^[20] In the present study, serum levels of lactate dehydrogenase (LDH), Gamma

glutamyl -transpeptidase (GCT) and alkaline phosphatase (ALP) were determined. As current study revealed, LDH were significantly increased at grades II and III as p values 0.022 and 0.001 respectively, as compared to normal values. These findings agreed with the studies of Mehdi et al.^[21] and Talaiezadeh et al.^[22] Our result also supported by some study mentions that level of LDHA is elevated in many malignant tumors and is associated with tumor proliferation and malignant growth, with potential implications for tumor diagnosis and therapy and The high activities of LDH in cancer cells may be due to the process of high cell proliferation, migration, or invasion than normal cells.^[23,22] Our study also study revealed, Gamma glutamyl transpeptidase (GGT) were significantly increased only at grade III (p value 0.022). These observations were in agreement with the studies of Fentiman, et al.^[24] and McElroy et al.^[25] Our results may support high levels of GGT seem to increase the risk of progression of high-grade cervical dysplasia to invasive carcinoma.^[24] GGT was not significant change in Stages I and II me be due to increased GGT associated with increased risk of breast cancer may partly be acting as a marker of these metabolic disorders.^[26] As current study revealed ALP did not bring any difference among the three grades. Similarly, Vanhoof et al. and Stieber et al. Did not find any significant difference in ALP levels in non-metastatic breast cancer.^[27,28] These observations were disagreement of Singh, et al, they concluded that, women with breast cancer have ALP activities generally higher than normal healthy women. The progressive increase in the serum ALP activities with breast cancer is an indication of metastasis.^[29] Amritpal kaur et al^[30] and Shrivastava et al^[31], found the levels of serum ALP were significantly higher in patients of carcinoma breast as compared to controls and that there was progressive increase in serum ALP activities with advance in stage of disease and metastasis.

CONCLUSION

The present observational study has shown a significant elevation in serum levels of LDH and GGT in cases of carcinoma Breast while ALP did not bring any significant and suggest that the estimation of LDH and GGT can be used as routine screening tests in all suspected carcinoma breast patients.

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