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Original Research Article

ANALYSIS OF SERUM LDH LEVELS IN PATIENTS OF BREAST CARCINOMA AT A TERTIARY CARE CENTRE

Jagdish Chandra Chaudhary[1], Rahul Kumar Githala[2], Bharat Kumar Maloo[3], Deepak Sethi[4], Anjali Sethi[5]

[1]Assistant Professor, Department of Surgery, Rabindra Nath Tagore Medical College, Udaipur, Rajasthan, India.
[2]Junior Specialist in Surgery, Rajkumari Amrit Kaur Government District Hospital, Beawar, Rajasthan, India.
[3]Assistant Professor, Department of Surgery, Government Medical College, Barmer, Rajasthan, India.
[4]Principal Specialist, Department of Surgery, Rabindra Nath Tagore Medical College, Udaipur, Rajasthan, India.
[5]Professor & Head, Department of Surgery, Ananta Institute of Medical Sciences & Research Centre, Kaliwas, Rajsamand, Rajasthan, India.

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Corresponding Author:
Dr. Deepak Sethi,
Email: drdeepaksethi2011@gmail.com

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Abstract

Background: Despite innumerable research the etiology of breast carcinoma remains elusive. Multiple studies have assessed the prognostic significance of serum lactate dehydrogenase (LDH) in patients with breast cancer, but their results remain controversial. Hence the present study aimed to analyze serum LDH levels in patients of breast carcinoma. **Materials and Methods:** Eighty cases of histopathologically confirmed carcinoma breast. Inclusion criteria for the present study included all patients recruited in the study were diagnosed with breast cancer and admitted in Maharana Bhupal Government hospital, Udaipur Rajasthan. A detailed clinical history and thorough complete physical examination of patients having breast cancer was carried out and entered in the proforma. Blood samples were drawn by venipuncture method and collected in a clean plan blood vial. The blood sample was sent to biochemistry laboratory where serum LDH was estimated by spectrophotometrically using their diagnostic kits at different time intervals like preoperatively and postoperatively. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. **Result:** In this study pre operative serum LDH ranged from a minimum value of 121.3 U/L to a maximum value of 683 U/L. Eleven patients (16.25%) had serum LDH greater than 401 U/L, ten (12.5%) had serum LDH level between 400 to 301 U/L, forty (50%) had serum LDH level between 300 to 201 U/L and seventeen patients (21.25%) had serum LDH < 200 U/L pre operatively. The mean serum LDH valve at preoperatively was 291.78±122.50 U/L. In the study, postoperative serum LDH minimum value was 131 U/L and maximum value was 489 U/L. Out of eighty, three patients (3.75%) had serum LDH level greater than 401 U/L after surgery of carcinoma breast, nine patients (11.25%) had serum LDH level 301to 400 U/L and forty two patients (52.5%) had serum LDH level 201to 300 U/L after surgery. Twenty-six patients (32.5%) had serum LDH level < 200 U/L after surgery. The mean serum LDH value postoperatively was 238.25±67.95 U/L. **Conclusion:** Serum total LDH levels and the gene for LDH-A, an isoenzyme, are frequently elevated in patients with cancer. An increased serum LDH level in breast carcinoma patients shows poor surgical outcome, and advanced disease. Monitoring of serum LDH levels can be used as a prognostic indicator in patients with breast carcinoma.

INTRODUCTION

Despite innumerable research the etiology of breast carcinoma remains elusive. However multiple risk factors have been identified that increase a woman`s risk of breast cancer development including genetic and familial factors; hormonal factors such as age, age at menarche, menopause, and first child birth; histological factors such as atypical hyperplasia and lobular carcinoma in situ; and life style factors such

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as postmenopausal obesity, alcohol consumption and radiation exposure. With the exception of genetic mutation, the majority of these risk factors are associated with small increase in the risk of breast cancer development.[1,2]

Under the normal conditions, each tissue maintains a steady and consistent enzymatic pattern, which is significantly altered in malignancy, because membrane constituents are shed into the surrounding milieu at increased rate when cells replicate more rapidly. The enzymes and proteins present in nucleus, cytoplasm and mitochondria are also released in the circulation when cells are destroyed. The enzymatic changes in malignant tissue may result from genetic reprogramming to malignant behaviour, a likely strategy for survival of tumours. Moreover, the protection of cell against cytotoxic effects of active oxygen species is achieved through superoxide dismutase (SOD), an enzyme shown to protect DNA, proteins and cell membranes from oxidative stress for the survival of the tumour cell, that is expected to be increased. Besides, many quantitative alterations in serum protein in patients with cancers of various origins have been elucidated.[3,4]

It is now generally accepted that the metabolism of cancer cells differs from that of normal cells. Under normal oxygen concentrations, tumor tissues, but not adjacent normal tissues, exhibit a high rate of glucose consumption. This phenomenon has been widely exploited for the diagnosis and staging of human solid cancers. 18F-Fluorodeoxyglucose positron emission tomography (18F-FDG-PET) utilizes the differences between glucose uptake of cancer cells and normal cells to make an imaging technique for detecting tumors. Besides, cancer cells preferentially metabolize glucose by glycolysis to generate energy even in the presence of adequate oxygen. Lactate dehydrogenase (LDH) is the most important metabolic enzyme involved in glycolysis as it can convert pyruvate to lactate at the end of glycolysis.[5] Multiple studies have assessed the prognostic significance of serum lactate dehydrogenase (LDH) in patients with breast cancer, but their results remain controversial.[6-9] Hence the present study aimed to analyze serum LDH levels in patients of breast carcinoma.

MATERIALS AND METHODS

Source of data included hospitalized patients, who were undertaken for breast Surgery in the department of general surgery at Rabindranath Tagore medical college (RNTMC) and Maharana Bhupal Government Hospital, Udaipur from October 2019 to November 2021. Eighty cases of histopathologically confirmed carcinoma breast. Inclusion criteria for the present study included all patients recruited in the study were diagnosed with breast cancer and admitted in Maharana Bhupal Government hospital, Udaipur Rajasthan. A detailed clinical history and thorough complete physical examination of patients having breast cancer was carried out and entered in the proforma. All patients were assessed to have breast cancer clinically, radiologically by USG breast or mammography and cytologically by FNAC or trucut biopsy having shown a malignant lesion. Detailed information about disease, procedure was given to patients, and informed consent was obtained from the patients before subjecting the patients to evaluate serum LDH. Under all aseptic conditions, blood sample were drawn by venipuncture method and collected in a clean plan blood vial. The blood sample was sent to biochemistry laboratory where serum LDH was estimated by spectrophotometrically using their diagnostic kits at different time intervals like preoperatively and postoperatively. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

The mean age of presentation was 50.56 ± 4.81 years. Out of eighty cases fifty-one (63.75%) had a lump in left breast and twenty-nine (36.25%) had a lump on the right side. Maximum number of cases presented within six months after the onset of symptoms (n=35, 43.75%). A large number of cases were presented within two months and 7-12 months (n=18, 22.5%). Out of eighty, nine cases (11.25%) were presented late after twelve months of onset of symptoms. The mean duration of symptoms was found to be 7.43 months. In this study, all the cases were confirmed histopathologically either preoperatively, by subjecting the patients to FNAC or trucut biopsy and postoperatively after the surgically excised tumor mass. Out of eighty cases, seventy-seven (96.25%) cases were reported as invasive or infiltrating ductal carcinoma. Out of seventy-seven cases of invasive ductal carcinoma, sixty-six (82.5%) were of NOS (not otherwise specified) group, five were of comedo pattern, one was of mucinous type, three were of medullary types and two were of papillary type. Two cases which were suspicious for malignancy on FNAC were confirmed for malignancy after surgery by histopathology. In this study pre operative serum LDH ranged from a minimum value of 121.3 U/L to a maximum value of 683 U/L. Eleven patients (16.25%) had serum LDH greater than 401 U/L, ten (12.5%) had serum LDH level between 400 to 301 U/L, forty (50%) had serum LDH level between 300 to 201 U/L and seventeen patients (21.25%) had serum LDH < 200 U/L pre operatively. The mean serum LDH valve at preoperatively was 291.78±122.50 U/L. In the study, postoperative serum LDH minimum value was 131 U/L and maximum value was 489 U/L. Out of eighty, three patients (3.75%) had serum LDH level greater than 401 U/L after surgery of carcinoma breast, nine patients (11.25%) had serum LDH level 301to 400 U/L and forty two patients (52.5%) had serum LDH level 201to 300 U/L after surgery. Twenty-six patients (32.5%) had serum LDH level < 200 U/L

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after surgery. The mean serum LDH value postoperatively was 238.25±67.95 U/L.

Table 1: Distribution of patients according to side involved.

Side of Breast	No. of cases	Percentage (%)
Left	51	63.75
Right	29	36.25
Total	80	100

Table 2: Distribution of breast malignancy studied according to histopathological types.

Histopathological Report	No. of cases	Percentage (%)
Infiltrating Ductal Carcinoma	77	96.25
Ductal Carcinoma In Situ	2	2.5
Adenocarcinoma	1	1.25
Total	80	100

Table 3: Distribution of serum LDH Preoperatively in carcinoma breast patients in this study

Serum LDH	No. of cases	Percentage (%)
100-200 U/L	17	21.25
201-300 U/L	40	50
301-400 U/L	10	12.5
>401 U/L	13	16.25
Total	80	100

Table 4: Distribution of serum LDH Postoperatively in carcinoma breast patients in this study

Serum LDH	No. of cases	Percentage (%)
100-200 U/L	26	32.5
201-300 U/L	42	52.5
301-400 U/L	09	11.25
>401 U/L	03	3.75
Total	80	100

DISCUSSION

Breast cancer is ranked number one cancer among Indian females with age adjusted rate as high as 25.8 per 100,000 women and mortality 12.7 per 100,000 women. Data reports from various latest national cancer registries were compared for incidence, mortality rates. Mortality-to-incidence ratio was found to be as high as 66 in rural registries whereas as low as 8 in urban registries. Beside this young age has been found as a major risk factor for breast cancer in Indian women. Breast cancer projection for India during time periods 2020 suggests the number to go as high as 1797900. Better health awareness and availability of breast cancer screening programmes and treatment facilities would cause a favorable and positive clinical picture in the country. Cancer that is detected early can be cured when tumor is small enough to be completely removed surgically. Unfortunately, most cancers do not produce any symptoms until the tumors are either too large to be removed surgically or cancerous cells have already spread to other tissues that is metastasis has taken place. Hence there is a need to detect cancer at an early stage.[10-12]

The mean age of presentation was 50.56 ± 4.81 years. Out of eighty cases fifty-one (63.75%) had a lump in left breast and twenty-nine (36.25%) had lump on right side. Maximum number of cases presented within six months after the onset of symptoms (n=35, 43.75%). A large number of cases were presented within two months and 7-12 months (n=18, 22.5%). Out of eighty, nine cases (11.25%) were presented late after twelve months of onset of symptoms. The mean duration of symptoms was found to be 7.43 months. In this study, all the cases were confirmed histopathologically either preoperatively, by subjecting the patients to FNAC or trucut biopsy and postoperatively after the surgically excised tumor mass. Out of eighty cases, seventy-seven (96.25%) cases were reported as invasive or infiltrating ductal carcinoma. Two cases were reported as ductal carcinoma in situ type and only one case as adenocarcinoma. Out of seventy-seven cases of invasive ductal carcinoma, sixty-six (82.5%) were of NOS (not otherwise specified) group, five were of comedo pattern, one was of mucinous type, three were of medullary types and two were of papillary type. Two cases which were suspicious for malignancy on FNAC were confirmed for malignancy after surgery by histopathology. Liu D et al evaluated the prognostic value of LDH in breast cancer by meta-analysis. Electronic searches for relevant articles were conducted in PubMed, Embase and Web of Science databases. The HR and their 95% CI were used to assess the prognostic value of serum LDH. Stata Statistical Software 12.0 was applied for statistical analysis. A total of 11 studies involving 6,102 patients were subjected to final analysis. Our results showed that higher serum LDH had significant effect on poor overall survival (HR, 1.88; 95% CI, 1.68–2.11) and progression-free survival (HR, 1.98; 95% CI, 1.46–2.68). Moreover, the results of subgroup analyses were consistent with that of overall outcomes. No significant heterogeneity and publication bias were found in their study. Serum

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LDH could act as a prognostic factor for patients with breast cancer.[13]

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Malhotra G et al assessed the clinical profile of breast carcinoma and determine the correlation of serum lactate dehydrogenase levels with the stage of the disease and assessment of high-risk features using histopathology and immunohistochemistry. A total of 75 patients with carcinoma breast were enrolled for this study and classified into two groups: upfront surgery and post-adjuvant therapy. Serum LDH levels were estimated a day before the surgery (baseline) and on postoperative days 1, 7, 14, and 30. The clinical tumor, node, metastasis (cTNM) staging was correlated with pathological tumor, node, metastasis TNM (pTNM) staging and immunohistochemistry findings. The clinical characteristics of breast cancer, serum LDH levels, and stage of the disease were collected and analyzed. A significant decreasing trend was noted in LDH values post-op days, and statistically significant higher LDH values were noted in the triple-negative group, positive lymph nodes, and positive lymphovascular invasion patients. Regularly elevated levels or an unanticipated rise in serum LDH might indicate poor outcomes. Hence, this non-specific enzyme marker can be suggested to be used routinely to assess disease outcomes.[14]

Mishra et al performed a study to evaluate the blood levels of biochemical parameters in breast cancer with and without metastasis. They found that breast cancer patients with metastasis had higher pre-treatment serum LDH levels than those without metastasis (mean LDH level was 730 and 433 U/L, respectively). This phenomenon may be interpreted by medical conditions in patients with advanced or metastatic stages that are more likely to be influenced by systemic effects from the cancers.[15]

CONCLUSION

Serum total LDH levels and the gene for LDH-A, an isoenzyme, are frequently elevated in patients with cancer. An increased serum LDH level in breast carcinoma patients shows poor surgical outcome, and advanced disease. Monitoring of serum LDH levels can be used as a prognostic indicator in patients with breast carcinoma.

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