

Assessment of Serum Zinc and Iron among Sudanese Women with Breast Cancer in Khartoum State

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ABSTRACT

Objective: This study aimed to evaluate serum levels of iron, zinc in Sudanese women with breast malignancy.

Methods: Serum levels of iron, zinc were estimated by atomic absorption spectrophotometry in serum samples of 60 breast cancer patient on different stages and gender matched 40 healthy individuals. The test groups were classified according to stage of disease in to three stages (stage one, stage two an stage three). The (mean \pm SD) was calculated. T. test or ANOVA was used for comparison between groups using SPSS v16.

Result: The serum zinc in patients and controls respectively were (0.54 \pm 0.30, 1.09 \pm 0.23 mmol/l) and serum iron patients and controls respectively were (0.55 \pm 0.34, 1.04 \pm 0.28 mmol/l). Serum zinc and iron were significantly lower in women with breast cancer compare to healthy women (p. value <0.000 and 0.000) respectively. There were statistically significant differences of serum level of zinc and iron between three stages: Zinc (Stage 1: 0.918 \pm 0.25) vs (Stage 2: 0.443 \pm 0.05) vs (Stage 3: 0.259 \pm 0.06) (p. value <0.000 and 0.037) respectively. Iron (Stage 1: 0.954 \pm 0.26) vs (Stage 2: 0.433 \pm 0.06) vs (Stage 3: 0.239 \pm 0.07) (p. value <0.000 and 0.000) respectively.

Conclusion: The serum level of zinc and iron were significantly lower in women with breast cancer and significant with different stage of disease. Zinc and iron were lower in stage three, two and one respectively.

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INTRODUCTION

Breast cancer is considers as one of the most common women cancer¹, with low survival rate in developing countries².

Worldwide, breast cancer accounts for 22.9% of invasive cancers and 16% of all cancers in women³. In 2008, it was

estimated that 458,503 deaths were caused by breast cancer (13.7% of cancer death in women)⁴.

Zinc is a micronutrient which is essential for human health playing role as a cofactor of enzyme such as dehydrogenases, peptidases and component of zinc finger domains. In metabolic pathway immune processes maintaining iron balance between other element recently it has been reported that zinc may play role in chemoprevention and its level may be associated with cancer risk. Zinc it is second to iron as the most abundant trace element in the body⁵.

Iron is Key trace element that is required for delivery of oxygen to tissues and the use of oxygen at the cellular and sub cellular levels. It serves as a functional component of iron containing protein including hemoglobin, myoglobin cyochrome and specific iron containing enzymes⁶.

Breast cancer is a public health problem world wide, in Sudan there is high mortality rate among breast cancer women and most of patients are detected at later stage of the disease due to lack of an effective health education and screening program. Trace element a chemical element required in minute quantities very small for physiological functioning. Serum trace element (zn-fe) may be important to find out the breast cancer markers that may help in diagnosing the disease and response to treatment. In this study we aimed to assess the serum zinc, iron in different stage of breast cancer in Sudanese women. The objective of this study was to evaluate serum levels of iron, zinc in Sudanese women with breast malignancy.

MATERIAL AND METHOD

This case-control and hospital based study conducted in Khartoum state during September 2014 on Sudanese female diagnosed histopathologically with breast

cancer (test group n=60) and aberrantly healthy female without breast cancer (control group n=40). Both groups were age matched. Female with other type of cancer or with iron deficiency anemia or with iron supplementation or liver disease or kidney disease were excluded. Permission of this study was obtained from the local authorities in the area of the study. An informed consent was obtained from each participant in the study after explaining objectives of the study. Using local antiseptic for the skin (70% ethanol), a sample of venous blood (3ml) was collected from each participant. The blood samples were allowed to clot at room temperature and then centrifuged at 4000 rpm for 5 minutes to obtain the serum.

Then the serum zinc and iron measured using atomic absorption spectrophotometer.

The precision and accuracy of all methods used in this study was checked each time a batch was analyzed by including commercially prepared control sera. Interview with the test group and control were done to obtain the clinical data. Clinical assessment was done by the consultant obstetrician in Khartoum State. A questionnaire was specifically designed to obtain information which help either including or excluding certain individual in or from study respectively. Data was presented in table and figure.

The data collected in this study was analyzed using SPSS. The mean \pm SD serum (Zn-fe) will be calculated the test was used for comparisons. (p value \leq 0.05 is considered to be significant).

RESULT

Sixty women with breast cancer were participated in this study as test group and 40 apparently healthy women as control group were. The complete blood count was done to both groups control and there were no signs of Iron deficiency or abnormal

blood picture for all participants. There was no Iron supplementation to control and test group. The two groups were age matched. (38-65) year, there was no another cancer or liver disease, we done to all group serum Zinc and serum Iron.

The test group was classified according to stage of disease in to three stages (stage one, stage two and stage three).

As demonstrated in **(Table 1)**, the serum levels of zinc and iron were significantly lower in women with breast cancer compared to healthy women (p. value < 0.0001). In breast cancer women, there were significant differences in both Zinc **(Figure 1)** and Iron **(Figure 2)** serum levels between different stages of cancer (ANOVA, p. value <0.001) with levels in stage two and stage three greatly lower than stage one.

There was no correlation between serum levels of Zinc and Iron with age of breast cancer women (p. value > 0.05).

DISCUSSION

Serum trace elements are significantly lower in breast cancer patient compared to controls. Gel electrophoresis may be important to find out the breast cancer markers that may help in diagnosing the disease and response to treatment.

This is analytic cross-sectional hospitalized based study, was carried out in name. The study was conducted in September 2014. Sixty Sudanese patients with breast cancer and forty healthy women. The main aim of the study is to measure serum level of zinc and iron in patients with breast cancer, to compare it to what has been reported worldwide.

In this study the serum level of zinc and iron were significantly lower compare to control group (p. value < 0.000 and 0.000 respectively) this was agreement with study conducted by Silva *et al*⁷ Skrajnowska *et al*⁸, and Jain *S et al*⁹ who observed that A

significant difference in Zn and Fe levels were observed between patients with breast cancer and control group. And disagreed with study carried out by Greaki K *et al*¹⁰ who observed that the serum level of Zn and Fe was increased across the three groups studied. The differences between our result and these results may due to the differences in method used for investigation and sample size.

Our findings showed insignificant correlation between age and trace element among women with breast cancer (p>0.05). This finding has been substantiated by Jain *S et al*⁹ and Silva *et al*⁷ who observed that there was insignificant correlation between age and trace elements. Our study recommended that trace element should be measured periodically in breast cancer patients, further studies with large sample size should be done and using more sensitive techniques. Further studies should be done to assess trace element among all cancer patient.

CONCLUSION

This study concluded that the levels of zinc and iron were significantly lower in breast cancer women when compare with normal healthy women. The serum concentrations of zinc and iron were decreased in the different stage of disease. There was no correlation between age of women with breast cancer and serum levels of zinc and iron.

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Table 1. Comparison the mean serum levels of trace element between the control and patients with breast cancer

	Control n= 40	Patient n=60	p. value
Zink	1.09 ± 0.23	0.54 ± 0.30	<0.001
Iron	1.04 ± 0.28	0.55 ± 0.34	<0.001

Data represent mean ± SD.

T. test used to calculate p. value between two groups.

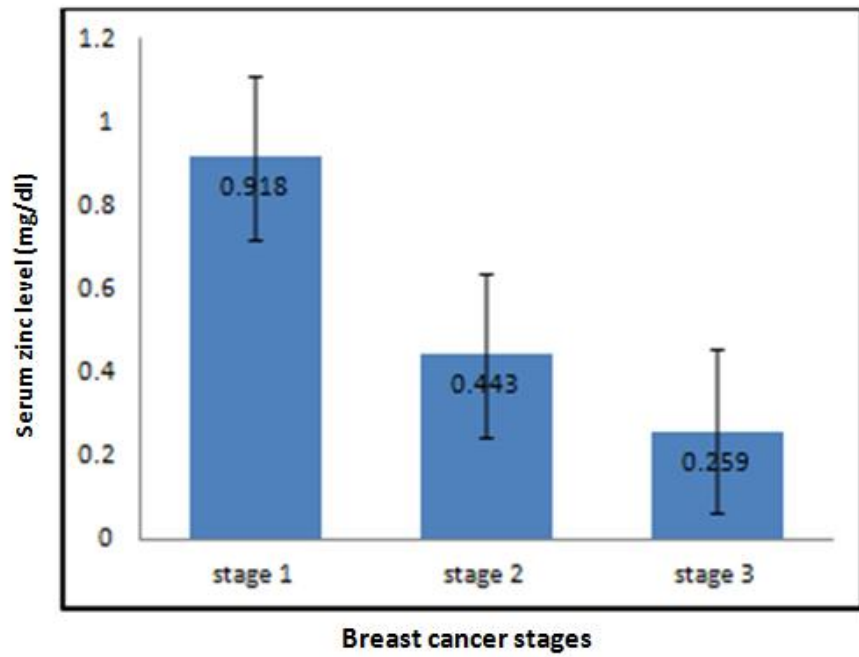


Figure 1. Bar plot showing comparison of mean serum zinc levels (mg/dl) between different stages of breast cancer

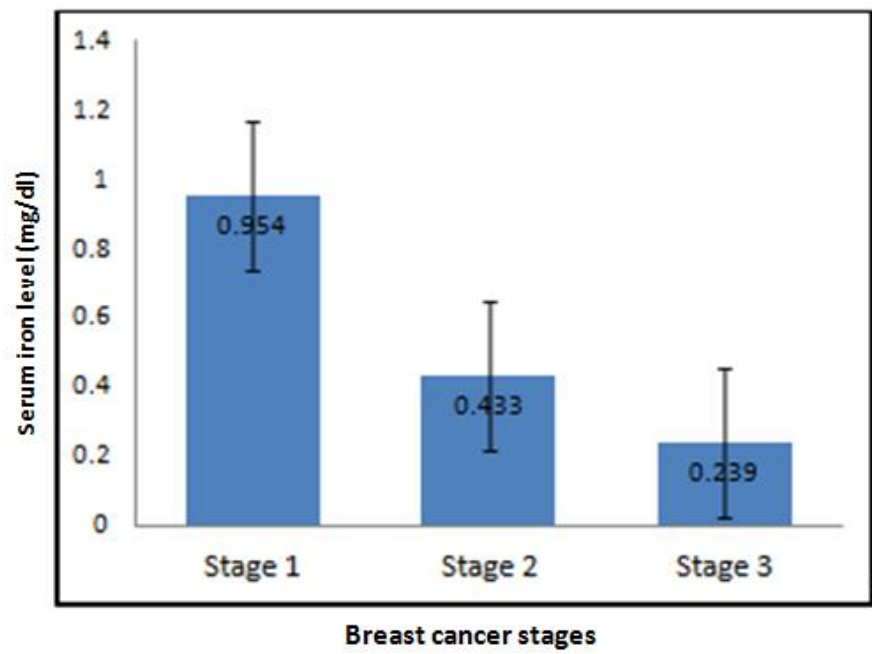


Figure 2. Bar plot showing comparison of mean serum iron levels (mg/dl) between different stages of breast cancer