Shendi University Journal of Applied Science, Issue (10) , June 2023 (09): p 109-113

RESEARCH ARTICLE

Hematinix Status IN Breast Cancer Patients in Sudan

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Abstract

Breast cancer is a major public health problem in both developed and developing countries (1) with more than one million new cases diagnosed annually.(2) Breast cancer remains a common and frequency fatal disease More than (1.2 million) women are diagnosed with breast cancer annually worldwide. In developed countries, most patients (>80%) with breast cancer present with operable disease that can apparently be entirely resected surgically. (3) This is a prospective cross-sectional descriptive study based on laboratory data of (136) patients with breast cancer carried out from (2012-2017) in Nuclear Medicine and Cancer Research centre - Shendi University and Nuclear Medicine and Cancer Research Centre - Aljazeera University, which aimed to evaluate hematinix status in breast cancer patients in Sudan. The investigations were performed on serum sample obtained from venous blood sample drawn in plain container for vitamin B12, folic acid and ferritin by using ELISA techniques.

Regarding the hematinix status in breast cancer patients, the mean of vitamin B12, folic acid and ferritin was (364.6 pg/ml), (7.5 ng/ml) and (189.9 ng/ml) respectively. The study conducted that ferritin level was elevated in breast cancer patients with highly statistical significant differences regarding anemic status, vitamin B12 and folic acid levels were within normal range in study population

Keywords: Breast cancer, Vitamin B12, Folic acid, Ferritin.

INTRODUCTION:

Breast cancer is the uncontrolled growth of abnormal cells in the breast. As with other forms of cancer, breast cancer is considered to be a result of malfunctioning DNA due to damage or inherited

mutation. Breast cancer is a disease that typically develops in women; however, it is also possible, although rare, for breast cancer to develop in men. According to the World Health Organization (WHO), more than (1.2 million) people worldwide will learn breast cancer this year. [4]

The risk of breast cancer is low in the low-income regions of Sub-Saharan Africa and in Asia, including Japan where the probability of developing breast cancer by the age of (75 years) is (1/3rd) that of other high-income countries. [5]

Clear increases in the incidence of, and mortality from, breast cancer were observed up to the early 1980s in both high-income and low-income countries. The subsequent advent of early detection and screening programmes in high-income countries altered the reported rates of both incidence and mortality, masking trends in the underlying risk for the disease. Mortality rates for breast cancer in Western Europe and North America are in the order of (15–25/100 000) women, being slightly more than a (1/3rd) of the incidence rate, which is approximately (50–60 /100 000). [5]

METHODS:

This is a prospective cross-sectional descriptive study based on laboratory data of (136) patients with breast cancer carried out from (2012-2017) in Nuclear Medicine and Cancer Research centre - Shendi University and Nuclear Medicine and Cancer Research Centre - Aljazeera University. The investigations were performed on serum sample obtained from venous blood sample drawn in plain container for vitamin B12, folic acid and ferritin by using ELIZA technique.

Vitamin B12 quantitative test is based on the principle of the enzyme linked immunosorbent assay. An antibody directed against vitamin B12 is bound on the surface of a microtiter plate. Vitamin B12 containing samples or standards and a vitamin B12-peroxidase conjugate are given into the wells of the microtiter plate. Enzyme labelled and free vitamin B12 compete for the antibody binding sites. After one hour incubation at room temperature, the wells are washed with diluted washing solution to remove unbound material. A substrate solution is added and incubated for 20 minutes, resulting in the development of a blue colour. The colour development is inhibited by the addition of a stop solution, and the colour turns yellow. The yellow colour is measured photometrically at 450 nm. The concentration of vitamin B12 is indirectly proportional to the colour intensity of the test sample. [6]]

Folic acid is bound to the surface of the microtitre plate. Samples, standards and a mouseanti-folic acid antibody are added to the wells. During following 1 hr incubation at room temperature competition takes place between folic acid fixed on the plate and folic acid in the solution. Unbound material is washed away and an anti-mouse-IgG-HRP antibody is added, which binds only to mouse

antibody bound on the plate. This technique offers the advantage that the HRP enzyme is not affected by interfering substances. After 1 hr incubation at room temperature any unbound material is washed away carefully and a colourless substrate is added. Blue colour is formed during following 20 min incubation which is stopped after 20 min by acid addition. Solution turns from blue to yellow. Optical density is measured at 450 nm with a plate reader, and the folic acid concentration is calculated against the standard curve. The colour intensity is indirect proportional to the concentration of Folic Acid in the sample, i.e. the less Folic Acid was in the sample the more conjugate could be bound and this causes a deeper colour.(6)

Ferritin Quantitative Test is based on a solid phase enzyme-linked immunosorbent assay (ELISA). The assay system utilizes one rabbit antiferritin antibody for solid phase (microtiter wells) immobilization and a mouse monoclonal anti-ferritin antibody in the antibody-enzyme (horseradish peroxidase) conjugate solution. The test sample is allowed to react simultaneously with the antibodies, resulting in the ferritin molecules being sandwiched between the solid phase and enzyme-linked antibodies. After a 45-minute incubation at room temperature, the wells are washed with water to remove unbound-labeled antibodies. A solution of TMB Reagent is added and incubated at room temperature for 20 minutes, resulting in the development of a blue color. The color development is stopped with the addition of Stop Solution, and the color is changed to yellow and measured spectrophotometrically at 450 nm. The concentration of ferritin is directly proportional to the color intensity of the test sample. (7)

RESULTS:

The age of women in the study was ranged between (17 to 85) years with mean of (50.2) years, most of study populations were in the age between thirty to sixty years old as demonstrate in (figure .1).

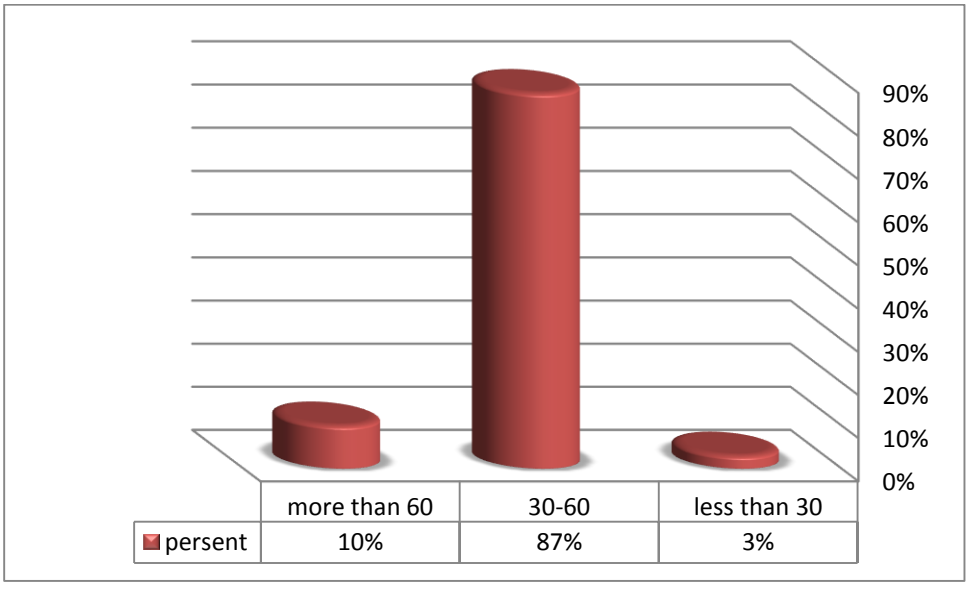


Figure (1): Distribution of age per years among study group

The nutritional substance level in breast cancer patients were illustrated in (table 1), as the mean of vitamin B12, folic acid and ferritin was (364.6 pg/ml), (7.5 ng/ml) and (189.9 ng/ml) respectively.

Table (1): Nutritional substances in breast cancer patients:

Parameter	Mean	Normal range
Vitamin B12	364.6	200.0-835.0 pg/ml
Folic acid	7.5	2.0 – 20.0 ng/ml
Ferritin	189.9	10.0-120.0 ng/ml

The mean of vitamin B12 level in anaemic and non anaemic breast cancer patients was (400.4 pg/ml), (331.1 pg/ml) respectively, while the mean of folic acid level in anaemic and non anaemic breast cancer patients was (8.3 ng/ml), (6.8 ng/ml) respectively, and the mean of serum ferritin level in anaemic and non anaemic breast cancer patients was (274.5 ng/ml), (119.9.1 ng/ml) respectively as displayed in (table 2).

Table (2): Nutritional substances in anaemic and non anaemic breast cancer patients:

Parameter	Status	Mean	Standard deviation	P.value
Vitamin B12	Anaemic	400.4 pg/ml	154.4	0.004
	Non anaemic	331.1 pg/ml	43.0	
Folic acid	Anaemic	٨.٣ ng/ml	3.8	0.077
	Non anaemic	٦.٨ ng/ml	4.1	
Ferritin	Anaemic	274.5 ng/ml	٣١.٦	0.001
	Non anaemic	119.9 ng/ml	١٤.٠	

DISCUSSION:

Breast cancer is the most frequently diagnosed and the leading cause of cancer death in women globally. Over the past few decades its incidence has increased but a fall in mortality has been observed due to improvement in survival which is associated with earlier disease detection, a multidisciplinary approach to treatment and biological changes that have made the disease more susceptible to hormonal therapy.

Regarding to the relationship between nutritional substance and anaemic status and different types of anaemia in breast cancer patient, the present study revealed that the mean of vitamin B12 level in microcytic, normocytic and macrocytic anaemic breast cancer patients was (411.3 pg/ml), (383.8 pg/ml) and (463.0 pg/ml) respectively, no statistically significant variation was observed with P.value of (٠.٧٨٨), while the mean of folic acid level in microcytic, normocytic and macrocytic anaemic breast cancer patients was (9.0 pg/ml),(7.5 pg/ml) and (8.1 pg/ml) respectively, no statistically significant variation was observed with P.value of (٠.٤٦٨), and the mean of ferritin level in microcytic, normocytic and macrocytic anaemic breast cancer patients was (286.1 ng/ml), (235.4 ng/ml) and (1000.0 ng/ml) respectively, no statistically significant variation was observed with P.value of (٠.١١٠). The folic acid level did not differ significantly between anemic (8.3 ng/ml) and non-anemic cancer patients (6.8 ng/ml), as the p value was (0.077). The mean of vitamin B12 level in anemic and non-anemic cancer patients was (400.4 pg/ml), (331.1 pg/ml) respectively with p value of (0.004), although the two means were fall within normal range of B12, so there was statistically significant difference, the slightly increase of vitamin B12 level among anaemic compared with non anaemic may be due abnormal vitamin B12 absorption and metabolism.

The present study revealed that the mean of serum ferritin level in anaemic and non-anaemic breast cancer patients was (274.5 ng/ml) and (119.9.1 ng/ml) respectively, with p value of (0.001), so there was highly statistical significant difference. The elevated serum ferritin level among breast cancer patients was in agreement with Sandhya Mishra and his colleagues in India [(8)], the reasons for high serum ferritin levels in patients with malignant disease are still far from clear. The evidence suggests that, while patients with early breast cancer have serum ferritin concentrations somewhat higher than normal, this could result from the non-specific effect of malignancy on RE iron metabolism. Jones and his colleagues pointed out that neoplasia is commonly associated with an abnormality of iron metabolism which manifests itself by a low serum iron concentration, an increase in RE iron and the anaemia of chronic disease . [(9)]

CONCLUSION:

From this study we can conclude that, the ferritin level was elevated in anemic patients with highly statistical significant differences regarding anemic status. Vitamin B12 and folic acid levels were within normal range in study population.

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