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## **Assessment of Serum Biochemical Parameters of Patients with Breast Cancer**

**O.C. Ojo\*, M.F. Asaolu, I. Akinlua**

Department Of Biochemistry, P.M.B 5363, Ekiti State University, Ado-Ekiti, Nigeria.

\*Correspondent e-mail: [talk2ojooc@gmail.com](mailto:talk2ojooc@gmail.com)

**Abstract** Breast cancer is a worldwide major public health problem in women population, affecting both the developed and developing countries. This study investigated the levels of serum biochemical parameter in patients with breast cancer and the control subjects. Two hundred and fifty (250) newly diagnosed patients with breast cancer aged between 45 and 75 years who were attending University Teaching hospital in Ekiti state and Federal Medical Centres in Ekiti and Ondo states were included in this study. The levels of serum albumin and total protein were estimated by biuret and bromocresol green –a dye binding method respectively. Creatinine and urea levels were measured spectrophotometrically. The results obtained indicated decrease in serum albumin and total protein while significant increase was observed in serum C-reactive protein and creatinine levels when compared to the control subjects. However, the selected serum biochemical parameters are very sensitive and could be useful biomarkers in the prognosis, diagnosis and treatment of cancer.

**Keywords** Serum albumin; Total protein; C-reactive protein; Creatinine; Breast cancer

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### **Introduction**

Breast cancer is a worldwide major public health problem in women population, affecting both the developed and developing countries comprising of 18% all female cancers [1]. More than 1.2 million cases are diagnosed every year, affecting 10-12% of the female population and accounting 500,000 deaths per year worldwide [2]. Unfortunately till now, there is no effective therapy that is able to cure or prevent the disease. Given this, a large number of epidemiological studies have been undertaken to identify potential risk factors for cancer.

Reporting of variation in incidence of breast cancer in different population of different parts of African continent maybe due to multiple factors including geographic variation, racial/ethnic background, genetic variation, lifestyle, environmental factors, socio economics status, the presence of known risk factors utilization of screening mammography stage of disease at diagnosis and the availability of appropriate care.

The increase in risk by breast cancer associated with positive family history as well as smoking [3]. Unfortunately till now, there is no effective therapy that is able to cure or prevent the disease. Different types of metabolic changes have been associated with the breast cancer. To the best of our knowledge, changes in biochemical profiles in women having breast cancer has not been fully reported and documented in south western Nigeria. Hence the objective of this study was to determine changes in the level of some biochemical parameters in women with breast cancer in south western Nigeria.

## **2. Materials and methods**

### **2.1 Samples**



Blood samples were collected from newly diagnosed patients (n=250) who were attending University Teaching Hospital in Ekiti State and Federal Medical Centres in Ekiti and Ondo states of Nigeria. An equal number of age matched healthy subjects were considered as normal/control. The complete clinical and personal history of the patient was obtained based on responses to questionnaires and clinical investigations. This study was approved by the institutional ethical committee.

## 2.2 Serum preparation

10ml of venous blood was obtained into sample bottles. The blood sample was allowed to clot, retracted and centrifuged at 3500 rpm for 5mins after which the serum was separated and kept at -20<sup>o</sup>celsius for further analysis.

## 2.3 Analysis of the parameters

Serum total protein was determined using biuret method as described by [4], albumin was determined using the method of bromocresol green as described by [5].

Urea estimation was done using the method of [6]. Creatinine was estimated by the method of [7] and C-reactive protein was assayed by using ELISA method described by [8].

## 2.4 Statistical analysis

Statistically analysis between the normal individual and patients was performed by the student t-test. The data expressed as mean  $\pm$  SD and  $p < 0.05$  was considered as significant.

## 3. Results

Table 1 showed a decrease ( $p < 0.05$ ) in serum albumin and total protein of breast cancer patients compared to the control group, while significant increase ( $p < 0.05$ ) was observed in serum C-reactive protein and creatinine levels of breast cancer patients when compared to the control subjects.

**Table 1:** Serum level of some biochemical parameters (albumin, total protein, urea, creatinine, and C-reactive protein) in patients with breast cancer

Parameters	Albumin (g/L)	Total Protein (g/L)	Urea (mg/dL)	Creatinine (mg/dL)	Crp (mg/dL)
Breast Cancer	36.03 $\pm$ 3.21 <sup>a</sup>	65.24 $\pm$ 7.54 <sup>b</sup>	5.06 $\pm$ 1.28 <sup>ab</sup>	9.38 $\pm$ 0.98 <sup>c1</sup>	1.15 $\pm$ 59.65 <sup>b</sup>
Control	40.63 $\pm$ 3.14 <sup>ab</sup>	81.14 $\pm$ 7.54 <sup>c</sup>	5.06 $\pm$ 1.28 <sup>ab</sup>	1.07 $\pm$ 0.20 <sup>a</sup>	0.80 $\pm$ 59.79 <sup>a</sup>

Results are expressed as means  $\pm$  standard deviation. Values along the vertical column with different superscripts indicate significant difference at ( $P < 0.05$ ).

## 4. Discussion

The breast is an external symbol of beauty and womanhood. However, breast cancer has been found to be one of the most common cancers in women of the developed and developing countries [9] about half the breast cancer cases and 60% of the deaths are estimated to occur in economically developing countries [10] as well as it is major health problem in India [11].

Plasma albumin concentration is commonly used as an index of nutritional status and has long been considered a measure of visceral protein status [12].

This present study revealed a decrease in the serum albumin level of breast cancer patients when compared to the control subjects. However, serum total protein decrease ( $p < 0.05$ ) in the test subjects when compared to the control subjects. The decrease observed in the serum total protein of breast cancer patients could be attributed to high proteolytic activity which is common in cancer patients as an antiapoptotic mechanism [13].

Urea and creatinine are nitrogenous and products of metabolism of protein. Urea is the primary metabolite derived from dietary protein and tissue protein turn over. Creatinine is the end product of muscle creatine catabolism [14]. Elevated levels of creatinine was observed in this study and no significant difference ( $p < 0.05$ ) was observed in the



level of urea in patients with breast cancer when compared to the control subjects. [15] also reported an increased level of plasma creatinine in liver and colorectal cancer patients. However, the significant increase observed could be a significant risk factor for cancer.

C-reactive protein is an important marker of inflammation which is known to be involved in the limitation and progression of cancer. This present study, observed an elevated level of C-reactive protein in the patients with breast cancer when compared to the controls. [16] reported similar observation. [17] also reported that patients with increased concentrations of C-reactive protein have reduced concentration of albumin and total protein. This might be due to the production of cytokines especially interleukins 6, which modulate the production of albumin in by hepatocyte.

However, the availability of mammography and high literacy rate have made the diagnosis and management of breast cancer an easy task in all part of the developed country as compared to the developing countries.

## 5. Conclusion

Assessment of the metabolic changes as well as its management in breast cancer women could be a help in progressive survival rate.

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