ISSN: 0975 -8542

Journal of Global Pharma Technology

Available Online at: www.jgpt.co.in

RESEARCH ARTICLE

# Evaluation of Antioxidant (GSH, CAT, SOD) and MDA in Iraqi Women with Breast Cancer

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## Abstract

Oxidative stress is considered to be involved in the pathophysiology of all cancers. The aim of this study is to examine oxidative stress and antioxidant status in patients with breast cancer by evaluation of the serum levels of lipid peroxidation products as malondialdehyde (MDA) and glutathione, catalase, Superoxide dismutase (GSH, SOD, CAT) of 30 new diagnoses with malignant breast cancer in and 30 healthy women were determined. Significant high levels of GSH, SOD, CAT were detected in control compared to patients with breast cancer ($p<0.0001$). Serum MDA levels of the patients were higher compared to the controls ($p<0.0001$).

**Keywords:** *Breast Cancer, Malondialdehyde, Catalase, Superoxide Dismutase, Glutathione.*

## Introduction

Breast cancer is the most common cancer among women in both the developed and the developing countries in the world with an estimated 1,671,149 new cancer cases diagnosed in 2012, which accounts for 25 % of all the cancers. With an estimated 521,907 cases of deaths due to breast cancer occurring in the world (2012), breast cancer ranks first as the cause of death from overall cancers in the world. For the least developed countries, breast cancer is the most frequent cause of cancer death among the women [1,2].

Antioxidants are compounds that react with free radicals either in vivo or in vitro and prevent oxidative damage. Endogenous antioxidant defenses are both enzymatic such as the superoxide dismutase, glutathione and catalase; while non-enzymatic antioxidants namely vitamin C, vitamin E and vitamin A which play a main role in protecting the body against the harmful effects of free radicals and prevents excessive oxidative damage [3]. Oxidative stress is a process which occurs due to a disturbance in the balance between the production of a reactive oxygen species (ROS) or free radicals (singlet oxygen, superoxide anions, hydrogen peroxide and hydroxyl radical) and the efficiency of the antioxidant defense systems like glutathione and enzymes such as superoxide dismutase (SOD), catalase (CAT), glutathione (GSH) [4]. The oxidative damage to both the nuclear DNA and the mitochondrial DNA may lead to mutations that activate oncogenes or inactivate tumor suppressor genes [5]. Amin KA et al, have reported the involvement of ROS in etiology and development of breast cancer [6].

## Materials and Methods

A total of 38 patients diagnosed with breast cancer (New diagnosis) in Al-Eluia hospital for woman care, oncology teaching hospital, and 38 control groups. All patients (35-55 years of age).Five (5) ml of venous blood sample was taken from patients and control groups of each participant. The sample bottle was centrifuged within one hour of collection, after which the serum was separated and stored at70 C until assayed. Following parameters were investigated MDA was evaluated calorimetrically by Ghufran Saad

Nasif [7]. Catalase and SOD levels were detected by using Abcam kit calorimetric-Fluorometric, GSH has done by Zayzafoon [8].

## Results

MDA levels ($p<0.0001$) in breast cancer patients were significantly higher than those of the control group. Catalase, GSH and SOD levels significantly lower ($p<0.0001$)in patients with breast cancer and controls groups. As seen in Table (1), and Figure (1,2,3,4).

**Table 1: Biomarkers levels of oxidative stress and antioxidant enzymatic of patients and control groups**

| Variables | people | No. | Mean | Std. Deviation | P _value |
|---|---|---|---|---|---|
| MDA (µmol/L) | patient | 38 | 9.884210526 | 1.2927085154 | 0.0001 |
| | control | 38 | 4.499331942 | 1.5594319732 | |
| GSH (µmol/L) | patient | 38 | 706.4737 | 169.30043 | 0.0001 |
| | control | 38 | 1437.4405 | 362.78371 | |
| CAT (nmol/mL) | patient | 38 | .00619992 | .017707643 | 0.0001 |
| | control | 38 | 0.12584724 | 0.031328497 | |
| SOD(µg/mL) | patient | 38 | .00641038 | .023302092 | 0.0001 |
| | control | 38 | .13853433 | .026035772 | |

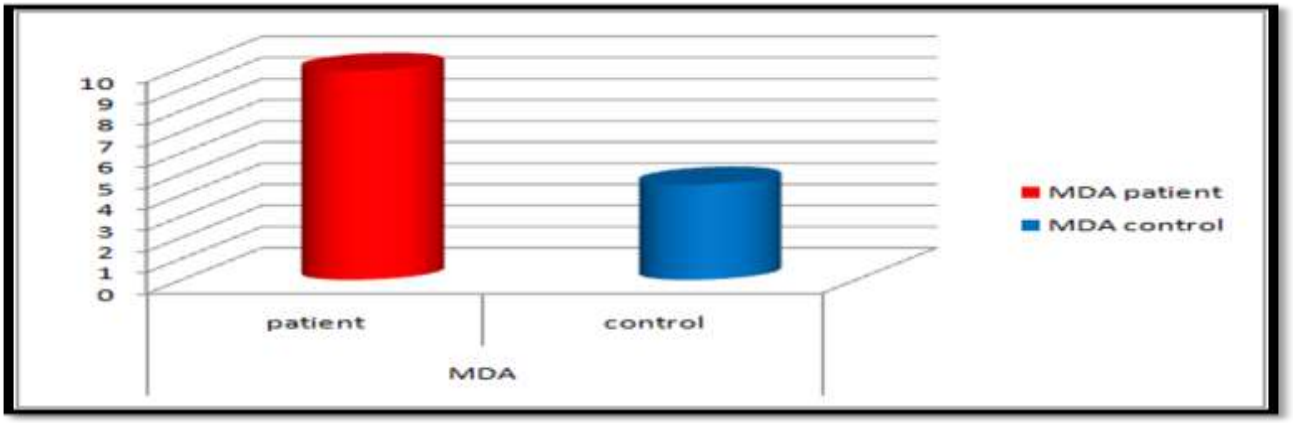


**Figure 1: Levels of MDA of breast cancer patients and control representing healthy subjects. Values represent the mean ±SD**

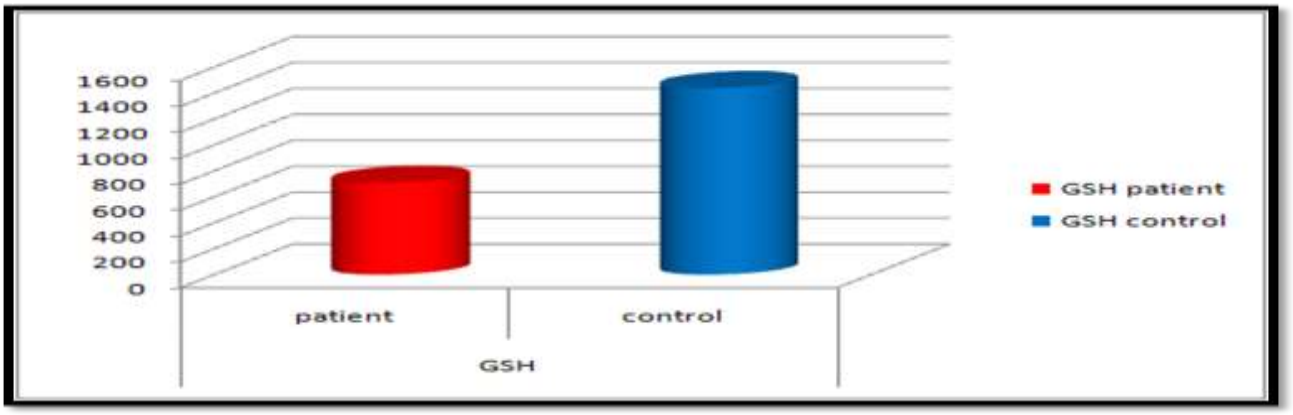


**Figure 2: Levels of GSH of breast cancer patients and control representing healthy subjects. Values represent the mean ±SD**

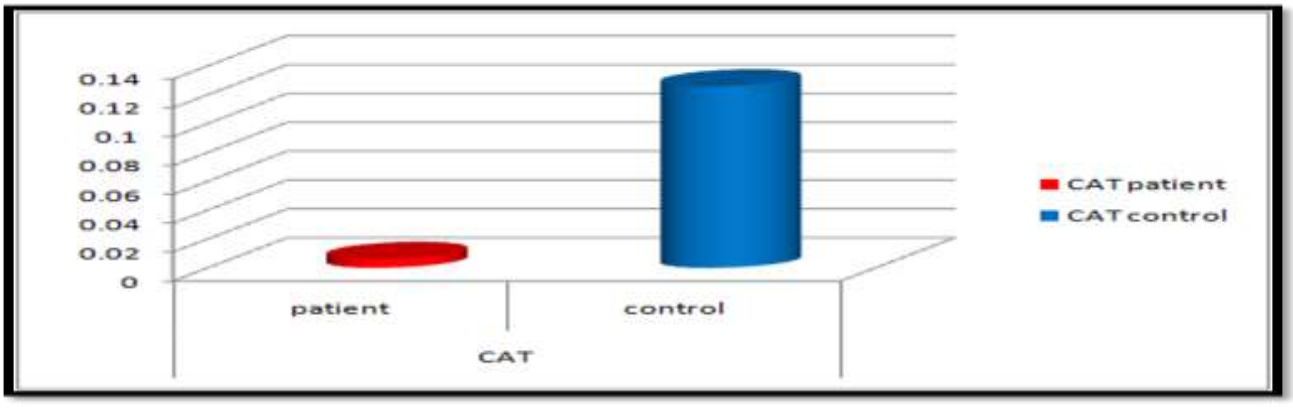


**Figure 3: Levels of catalase activity of breast cancer patients and control representing healthy subjects. Values represent the mean ±SD**

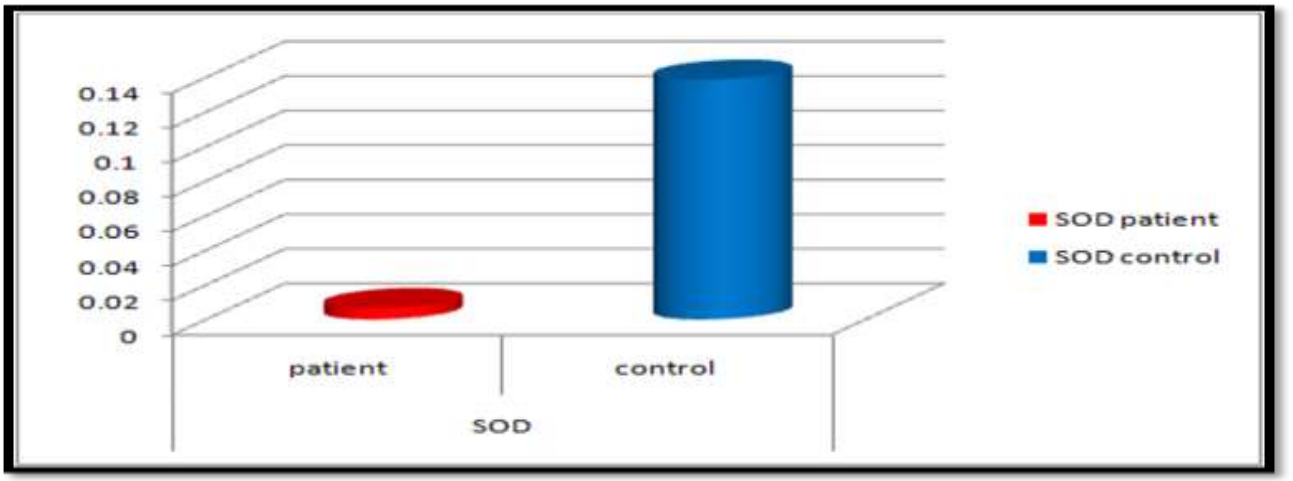


**Figure 4: Levels of SOD activity of breast cancer patients and control representing healthy subjects. Values represent the mean ±SD**

## Discussion

Oxidative stress produced through either increased free radical generation and/or a decreased antioxidant level in the target cells and tissues has been suggested to play an important role in carcinogenesis. It has been found that the reactive oxygen species are involved in the initiation and promotion of cancer [5,9]. Malondialdehyde (MDA), lipid peroxidation's secondary by-product, can boost reactive oxygen species generation in breast carcinogenesis [10].

In the current study, MDA levels are elevated in breast cancer patients than healthy individual which are similar to the findings of Rajneesh et al and Sharhan et al. reporting elevated MDA levels in breast cancer patients in comparison with controls [11,12]. In the study, conducted by Kumaraguruparan R, et al, and Portakal O et al, 66 found that the MDA levels were significantly raised in the breast cancer patients [13,14]. Hristozov D, *et al*, also came up with a similar finding, where the MDA levels increased significantly among the cancer patients when compared with the control [15]. The results of a reduced level of SOD were observed by Hristozov D, et al, who compared the SOD level in cancer patients with the control groups [15]. Many studies have reported the drastic change in antioxidant components in breast cancer women [11,12,16,17]. The present study demonstrated low levels of antioxidant in patients with breast cancer which concurring with the findings of Kasapovic *et al.* [18] and Malik et al. [17] which has reported low levels of SOD, CAT, and GSH in females having breast cancer.

These diminished levels are because of enhanced oxidative stress in tumor cells [17]. The result conducted by Ankita shows High significant levels of GSH, SOD, CAT were detected in control compared to patients with breast cancer, and MDA levels of the patients were higher compared to the controls this agreement with our study [19].

## Conclusion

Our study concluded that the oxidative stress in patients of carcinoma breast is increased as compared to healthy controls as evidenced by increased malondialdehyde (MDA) and decreased levels of (SOD, CAT, GSH) in breast cancer patients.

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