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Evaluation of Serum Glycoprotein, Seromucoid, Total Protein And Other Related Biochemical Parameters In Women With Breast Cancer

Jamal.A.AL. Jabbar.Attawi[1*] and Suhair Hameed Rasheed[2]

1. Foundation of Technical Education /Medical Technology Mansour-**IRAQ**
2. Al-Yarmook Teaching Hospital-Baghdad-**IRAQ**

Email: rusul.aljabbar@yahoo.com

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ABSTRACT

Glycoprotein is a protein containing branching chains of carbohydrate. Seromucoid fraction is a carbohydrate rich of serum protein. Serum total protein depends on the balance between synthesis and their catabolism or loss from body. This biochemical marker may be elevated in patients with breast cancer. To study the relationship between glycoprotein, seromucoid, total protein, alkaline phosphatase and ferritin in patients with different stages of breast cancer.

Keywords: Breast cancer, biochemical marker, Glycoprotien, Seromucoid, Ferritin.

INTRODUCTION

Glycoprotein is a protein containing branching chains of carbohydrate constituents which include hexoses (galactose or mannose) ' amino sugar ' fucose and sailic acid [1]. The source of increased glycoprotein occurring in cancer is related to major possibilities that must be considered as: increased carbohydrate content of normal protein, glycoprotein production by tumor it self and lastly the increased synthesis of glycoprotein by the liver and/ or reticular endothelial system [1].

The seromucoid fraction is a carbohydrate- rich of serum protein, may contain 95% or more carbohydrate. They are not easily precipitated by the usual strong acid protein precipitating agent but are precipitated by phosphotungstic acid. The seromucoid fraction includes orsomucoid, haptoglobin and α_1- acid glycoprotein [2].

The search for a biochemical test to detect the presence or extent of a tumor has led to the development of many assays that appear to be related to the increased liver synthesis of acute phase protein, these include seromucoid mainly α_1- acid glycoprotein [2]. The serum level of protein depends on the balance between their synthesis and their catabolism or loss from body [2]. Many serum proteins are synthesized in liver, but the blood cells and lymphocytes of the immune system synthesized immunoglobulins and proteins of complement system are synthesized by macrophages as well as hepatic cells [3].

Decrease in albumin level especially gamma globulins gives false impression that total protein level is within normal [3]. Alkaline phosphatase is found in many tissues, including bone, liver, intestine, kidney, and placenta [4]. Serum alkaline phosphatase measurement is of particular interest in the investigation of two groups of condition: hepatobiliary disease (hepatitis, cirrhosis or malignancy) and bone disease

associated with increased osteoblatic activity (child's rickets with Vit.D deficiency, Paget's disease, hypoparathyroidism in the metastatic carcinoma) [4]. Elevated levels of alkaline phosphatase are seen in primary or secondary liver cancer and bone cancer [4]. Other malignancies such as leukemia, sarcoma, ovarian carcinoma and lymphoma complicated with hepatic infiltration may also manifest elevated alkalin phosphatase levels [4].

Ferritin is iron storage protein. The protein component of ferritin (i.e apoferritin) is composed of 24 subunits arranged as sphericals. Two species of subunits have been found, the H form with a molecular weight of 21000 and the L form with a molecular weight of 19000[5]. Increased serum ferritin is found in iron overload, irrespective of the cause and in many patients with liver disease or cancer [6].

MATERIALS AND METHODS

Whole blood was drawn from 52 normal healthy controls, 52 pathological controls (benign breast mass) and 52 women with breast cancer. The blood was allowed to coagulate at room temperature and was centrifuged at 3000 r.p.m. for 15min. and the resulting sera were placed into test tubes and were used for determination of glycoprotein, seromucoid, total protein, alkaline phosphatase and ferritin levels while the remaining sera were stored frozen at -20c^{o} until use within a period of few or several days.The methods for glycoprotein, seromucoid, total protein, alkaline phosphatase measurement were by chemical analysis, while the method of ferritin measurement was by (ELISA)[7].

Statistical analysis: Students' t-test was used to determine the mean, the mean value for glycoprotein, seromucoid, total protein, alkaline phosphatase and ferritin whether it was significantly different in women with breast cancer, pathological controls and normal healthy controls $p<0.05$ was considered significant .

Table 1: Comparison of glycoprotein, seromucoid, total protein, alkaline phosphatase and ferritin values for sera of normal healthy controls, pathological controls and women with breast cancer (stage I and stage II) before and after treatment .

Group(n)	Glycoprotein g/dl (mean±SD)	Seromucoid mg/dl (mean±SD)	Total protein g/dl (mean±SD)	Alklain phesphataseU/L (mean±SD)	Ferritin ng/ml (mean±SD)	Age range (years)	P value
Normal healthy controls(52)	5.49±0.94	12.07±2.45	6.83±1.07	62.85±21.77	32.75±30.08	14-60	
Pathological controls(52)	5.15±1.04	13.17±3.26	7.10±0.9	64.34±19.57	32.26±30.52	18-60	0.026*
Newly diagnosed breast cancer(52)	6.34±0.82	15.32±3.29	8.09±0.85	96.19±35.88	96.56±69.94	25-60	0.040*
Stage I (33)	6.25±0.78	15.30±3.05	8.19±0.81	95.82±35.20	97.49±74.18	25-60	
Stage II (19)	6.49±0.87	15.37±3.75	7.93±0.92	69.84±38.0	94.95±63.80	25-59	
Treated breast cancer(15)	5.07±0.61	13.55±0.81	6.55±0.61	62.00±16.09	41.33±32.11	25-60	

*significant using student t-test between two independent means at 0.05 level of significance.

RESULTS AND DISCUSSION

Among women with breast cancer, (50%) had serum glycoprotein level within the range of normal healthy controls and (50%) their serum glycoprotein level lies within the range of pathological controls. Table 1 shows that serum glycoprotein, total protein, alkaline phosphatase and ferritin level of women with breast cancer which was significantly increased when compared to normal healthy controls ($p<0.0001$, <0.0001, <0.0001, <0.0001 respectively), while there was no significance when compared with pathological controls ($p<0.085$, <0.168, <0.705, <0.944 respectively), but serum seromucoid of women with breast cancer was significantly increased when compared to normal healthy controls and pathological controls ($p<0.0001$, <0.053 respectively).There was no significant difference in serum glycoprotein, seromucoid, total protein, alkaline phosphatase and ferritin levels in stage I when compared to stage II patients ($p<0.317$, <0.941, <0.292, <0.922, <0.901 respectively) (Table 1).

In post- therapeutic study, the results were decreased in the serum glycoprotein, total protein, alkaline phosphates and ferritin after treatment when compared to their level before treatment in women with breast cancer (<0.0001, <0.0001, <0.015, <0.028 respectively), while there was no significant decrease in their level before treatment in women with breast cancer ($p<0.0001$,$<0,0001$,<0.015,<0.028 respectively) ,while there was no significant decrease in the level of serum seromucoid in patients before and after treatment $p<0.079$)(Table 1 and Figures 1,2).

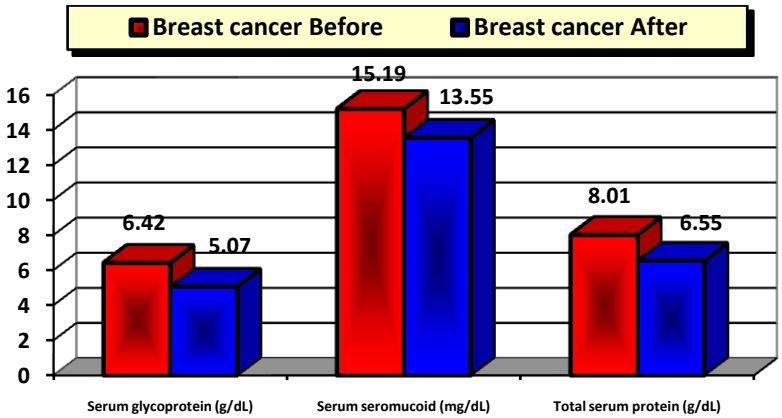

Figure 1. The serum value of glycoprotein, seromucoid and total protein in sera of breast cancer before and after treatment.

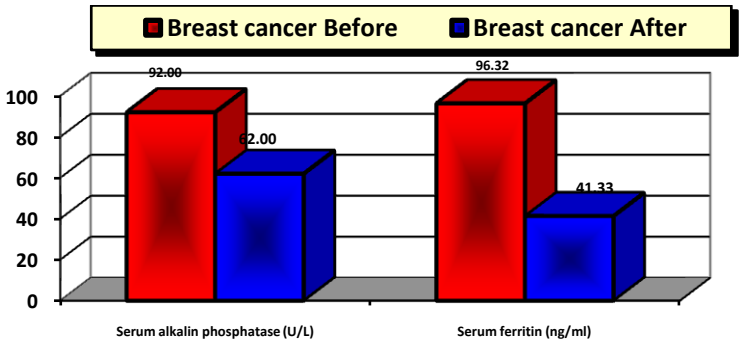

Figure 2. The serum value of alkaline phosphatase and ferritin in sera of breast cancer before and after treatment.

During the last decade, glycoprotein was recognized as an important group of compounds, found in all forms of life. The carbohydrate moiety may influence growth and cell to cell interaction, and thus be of importance in development of malignancy [8]. The possible reasons of increased serum glycoprotein in malignant disease currently being considered; first, glycoprotein production by the tumor itself , seconds, increased synthesis of glycoprotein by the liver and by lymphoreticular tissue.

Third, the elevated release of plasma glycoprotein merely reflects the occurrence of tissue destruction and the tissue proliferation or repair is a more probable explanation as an etiological factor to the behavior of glycoprotein in cancer. The results were in agreement with the results reported by Harvey, J.A, and Spinger, U.S, [7,8].

Increased serum seromuoid level was found in many types of cancer, Anderson. E [9], found that the highest values of seromucoid were found with widely disseminated cancer, while low elevation of serum seromucoid was found in malignant disease confined to bone [10]. Total protein was studied by many authors for different types of malignant disease and for evaluating various therapeutic approaches. Mark [11] reported that there was a significant decrease in serum total protein values in patients with malignant melanoma, carcinoma of the ovary, colorectal cancer, breast cancer and of the cancer compared to normal individuals.

Kemal. M [12], found elevation in serum total protein values in cancer patients compared to healthy individuals, while Raddish M.A [3], demonstrated normal level of serum total protein in bone cancer patients. The reason for the presence of increased level of serum total protein in patients with breast cancer might be due to an increase in immunoglobulin of patients with breast cancer. The results were in agreement with findings reported by Kemal M [12], but was in disagreement with Raddish M.A [3]. Serum alkaline phosphatase was elevated in patients with primary bone cancer as well as in individuals with metastatic bone cancers, serum levels reflect regression and progression of these diseases [7]. Ferritin levels droped early in the development of iron deficiency, before serum iron and transferrin saturation became abnormally low [13].

An increase in serum ferritin may be the first indication of iron overload, long before the signs and symptoms of hemochromatosis appear [14].However, the release of ferritin from damaged tissues in hepatitis, acute inflammatory conditions and a variety of malignant diseases, also dramatically increased the serum ferritin level [13,14]. In these situations, normal ferritin values can mask the presence of iron deficiency and examination of the bone marrow for stainable iron might be required to confirm the diagnosis [13,14].The moderate validity values of sensitivity for serum glycoprotein, seromucoid, total protein, alkaline phosphatase and ferritin made these parameters less important as diagnostic tools.

APPLICATIONS

Glycoprotien, seromucoid, total protein, alkaline phosphatase and ferritin may be useful in diagnosing breast cancer and flow up of the patients.significant decrease ($p<0.079$).

CONCLUSIONS

The concentration of glycoprotein, seromucoid, total protein,alkaline phosphatase and ferritin were measured in normal healthy controls,pathological controls(benign breast mass) and women with breast cancer (stage I and stage II) before and after treatment. Data analysis indicated significant increase in serum glycoprotein, Seromucoid, total protein, alkaline phosphatase and ferritin levels in women with breast cancer when compared to their levels in both pathological controls (benign breast mass) and normal healthy controls ($p<0.0001$, <0.0001 respectively).

Women with breast cancer who responded well to treatment, their levels of serum glycoprotein, total protein, alkaline phosphatase and ferritin showed significant decreased ($p<0.0001$, <0.0001, <0.015, <0.028 respectively), while seromucoid level showed no effect.

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