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Liver Function and Body Mass Index in Women with Breast Cancer in Nineveh Governorate, Iraq

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ABSTRACT

Breast Cancer is one of the most prevalent cancers in the world to strike women is breast cancer, and its death rates are rising. This study's objective is to evaluate how breast cancer impacts liver function within affected women in Nineveh Governorate, Iraq, in relation to body mass index (BMI). Between October 2024 and January 2025, 55 samples were collected from the Oncology and Nuclear Medicine Hospital in Mosul. There were 20 healthy women and 35 patients with breast cancer. The study was conducted at the Oncology and Nuclear Medicine Hospital in Nineveh Governorate, Iraq, and the ages of the patients varied in age from 14 to 75 years. Individuals using a history of diabetes, liver disease, or other chronic conditions were not included. The findings indicated a notable rise in other concentrations ($p < 0.05$). Biochemical indicators were compared. Patients with breast cancer were evaluated against a control group. This is a possibility that has been suggested, the relationship between cancer development and obesity, to improve disease management and treatment methods. This data highlights the importance of tracking liver functions and body mass index among people who have breast cancer. The current study showed that among women of childbearing age, there is a significant increase in genetic changes in estrogen and progesterone levels with aging (55-75). The effects of the findings are emphasized in connection with the hormones progesterone and estrogen. Furthermore, the effects of chemotherapy on various biochemical markers are examined.

Keywords: breast cancer, liver function, chemotherapy, body mass index (BMI), progesterone, and obesity

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Introduction

Breast Cancer is one kind of cancer that shows up as a breast bulge or enlargement when the nipple's fluids and blood leak from it. Other signs include the withdrawal of the skin covering the breasts and the surface movement of the natural breasts, which ultimately results in the tumor causing clear and fixed wrinkles in the skin These factors cause the nipple, which is frequently observed in this disease as an internal lump, to flatten until it eventually becomes beneath the skin surface next to the nipple The rise in the body's estrogen proportion above its typical level causes the incidence of cancer to rise. When breast cancer begins as a tiny pimple that doesn't hurt, it grows very quickly, alters the breast's structure, and spreads throughout the cells if left untreated [1-3]. Breast cancer continues to be a major contributor to this figure worldwide, as it concerns women's mortality from cancer. It is typified by unchecked cell division, which may be brought on by environmental variables, hormone abnormalities, or genetic alterations. Liver function is crucial for breast cancer patients receiving therapy because it metabolizes hormones, poisons, and

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medications. Additionally, Obesity is the condition identified as a factor that causes risks. Adipose tissue and breast cancer act as a site for the production of estrogen, which can promote tumor growth. The progression of breast cancer may be affected by changes in liver enzyme activity and metabolic dysfunction [4]. Aspartate aminotransferase (AST): The enzyme aspartate aminotransferase (AST) is present in several locations. Oxalo acetic acid is produced by transferring an amino group from aspartate to alpha-keto glutarate Glutamate The AST enzyme is found in most organs It is present in white blood cells, the liver, the heart, skeletal muscles, the kidneys, the brain, the pancreas, and the lungs AST levels in red blood cells are the highest These levels are low in specificity for any single disease. Alanine transaminase is another name for alanine aminotransferase, or ALT. An alternative name, the enzyme serum glutamic-pyruvic transaminase (SGPT), is the same as serum glutamate-pyruvate transaminase (GPT). Transaminase (EC 2.6.1.2) is what it is type of enzyme. Although it is most common in the liver, ALT can be found in plasma and other bodily tissues. It catalyzes the alanine cycle in two stages. It is common practice to assess serum ALT levels, aspartate transaminase (AST) levels, and their ratio (AST/ALT). They serve as indicators for liver health in clinical settings [5]. Alkaline phosphatase (ALP); The liver and intestine are two of the many tissues that contain the enzyme alkaline phosphatase (ALP), it have a significant impact. bones, kidneys, and ducts that engaged in the metabolism of proteins, fats, and carbohydrates. Its blood levels are typically monitored to evaluate the health of the liver and bones, and high or low levels can be This is a sign of several medical conditions. Breast cancer may be affected by alkaline phosphatase. High levels of this enzyme in the blood could indicate the presence of another substance. The existence of breast cancer and other malignant tumors in the body [6]. Bilirubin; Iron is coordinated in different proteins by bilirubin, a crucial consequence of heme (ferro proto porphyrin IX). This material has the capacity to be poisonous. However, the body has developed systems for safely disposing of and detoxifying it. Moreover, bilirubin and its metabolites, Bile and feces, as well as urine to a lesser extent, give a characteristic yellow hue [7]. Albumin: The primary protein in blood is albumin. It accounts for around half of the total Plasma, or the portion of blood that is devoid of blood cells, and has a protein level that varies between 3.4 and 5.4 g/dl. Albumin, a protein that is ultimately eliminated in extremely high amounts in the blood, is produced by the liver's hepatocytes. Very little albumin is generated by the hepatocytes of the liver. The liver stores hardly any albumin in the blood in large volumes [8]. Total protein: Proteins are composed of α-amino acids and are physiologically significant compounds. The aggregate term for the proteins found in blood is plasma proteins. The primary organ in charge of the synthesis of the primary organ in charge of the synthesis of more than 300 proteins found in plasma, except for gamma globulins, which are produced by plasma cells In the lymph nodes, it is found. It can be found in the spleen. It can be found in bone marrow. The total concentration of proteins can be impacted by a variety of disorders [9]. GGT: The liver, kidneys, pancreas, heart, and other organs all have high levels of the enzyme GGT. brain. Smaller quantities of it can also be found in other tissues. A protein that initiates a particular cell reaction is called an enzyme a particular chemical change is occurring. That takes place within the body [10]. Lactate dehydrogenase: The enzyme lactate dehydrogenase is found in nearly every bodily tissue. Liver disease, anemia, heart attacks, bone fractures, muscular damage, malignancies, and infections are among the conditions that can raise LDH levels in the blood. HIV, meningitis, and encephalitis are among the potential reasons. Another non-specific indicator of tissue injury is LDH [11,12]. The body mass index (BMI) is a metric that calculates a person's health risk based on their height and weight. BMI, which is measured in kilograms per square

meter, is calculated by dividing body mass by body height. This is computed by dividing the height in square meters by the mass in kilograms [13]. Prothrombin time (PT), a blood test, measures the amount of time it takes for blood to clot. Bleeding issues can be checked with a prothrombin time test, which is also used to assess the effectiveness of blood thinners [14].

Therefore, the study aims to estimate the occurrence based on the age of women during menstruation compared to women during menopause. It aims to estimate the impact of chemotherapy on liver function indicators and to estimate the impact of drugs on the liver function, as well as other biochemical factors, in female cancer patients in Mosul.

Materials and methods;

The study comprised 35 patients and 20 health officers. Blood samples were collected, and biochemical tests for liver functions, such as ALT, AST, ALP, bilirubin, albumin, Total protein, LDH, and prothrombin time (PT), were conducted among the affected women in Nineveh governorate, Iraq, admitted to the Oncology Hospital in Mosul, from October 2024 to January 2025. The tests were performed using the Cobas C311 device (Roche Diagnostics, Germany), and Roche-approved commercial reagents were used according to the designs provided by the manufacturer. Weight (kg) divided by the square of height (m2) yielded the body mass index, or BMI.

Statistical Analysis;

For the statistical presentation of results (Using the "Statistical Package for the Social Sciences (SPSS) version 26.0," the data's mean and standard deviation has been updated The results will be interpreted utilizing the t-test for independent samples P values represent the significant comparison for any test values higher P>0.05) are regarded as not being statistically significant (P >0.05) are regarded as not being statistically significant. (NS), while those with P values less than 0.05 (P<0.05) are regarded as statistically significant

RESULTS AND DISCUSSION;

The current study caused a notable rise in alanine aminotransferase (ALT). aspartate aminotransferase (AST), and alkaline phosphatases (ALP) are some of the important enzymes that should be monitored., bilirubin, albumin, total protein, gamma-glutamyl trans peptidase (GGT), lactate dehydrogenase (LDH), prothrombin time (PT), and BMI. A significant increase in age (n = 55–75 years). Two genes have been shown to influence an individual's susceptibility to breast cancer. BRCA1 and BRCA2. The risk of ovarian cancer is also increased by mutations in these genes. A hereditary gene mutation, such as BRCA1 or BRCA2, may be the cause of up to 10% of breast cancers. Breast cancer cases are influenced by mutations, and gene mutations such as BRCA1 or BRCA2 are a factor in cases of breast cancer. The genes most often mutated are known as BRCA1 and BRCA2 Long-term exposure to reproductive hormones raises the risk of breast cancer long periods increases your risk of breast cancer. is the reason why women who have early periods before the age of twelve or late menopause after Individuals aged 55 years and over are more likely to experience adverse outcomes several reasons lead to an increased women's risk of developing breast cancer during the women's risk of developing breast cancer during the in women during the period There are several reasons that lead to an increased risk of A comparison of breast cancer in women during the menstrual cycle with Hormonal causes include variations in the levels of progesterone and estrogen. During menstruation, levels of estrogen and progesterone hormones change. This leads to the growth of mammalian cells and an increased risk of developing Estrogen contributes to the development of mammalian cells; the growth of mammalian cells is influenced by estrogen. Elevated levels been connected to a higher chance of increased risk of cancerous changes in breast cells Breast cells change during menstruation,

which increases the risk of developing breast cancer Increased vascular growth: Increased growth of blood vessels in the breast can increase the risk of cancer Genetic causes can also increase the risk of cancer Additionally, patients who are undergoing chemotherapy exhibit higher liver enzyme levels than those who are not, suggesting possible drug-induced hepatotoxic effects This suggests possible drug-induced hepatotoxic effects The study also highlights the potential role of liver Disease severity and treatment response can be assessed using enzymes as biomarkers.

Table (1) Levels of Biochemical variables (Mean ±S.D.) related to liver function in women with Breast Cancer and Control

Biochemical parameters	Groups (Mean ± Standard Deviation)		
	Control	Patient	p-value |
Alanine aminotransferase (ALT) mg/dl	21.9±2.99	36.44±5.22*	<0.05
Aspartate aminotransferase (AST) mg/dl	26.83±5.43	44.62±5.72*	<0.01
ALkaline phosphatases (ALP)U/L	123 ±28.7	318.49*	<0.01
Bilirubin mg/dl	1.0 ±0.33	3.98±0.47*	<0.05
Albumin g/dl	3.70±0.45	6.70±1.43*	<0.05
Total protein mg/dl	7.54±1.2	10.54±3.22*	<0.05
Gamma-glutamyl trans peptidase (GGT)mg/dl	18.27±2.9	98±34.44*	<0.01
Lactate dehydrogenase LDH (mg/dl)	68.42±22	174.93±38.6*	<0.01
Prothrombin time (PT)	0.8±0.2	1.9±0.34*	<0.01
BMI (kg/m)	25.8±5.32	36±8.22	<0.05

Aspartate aminotransferase (AST)*

The probability of an appreciable rise in AST levels is shown as a function of probability ($P \leq 0.05$) in Table 1. The serum of patients with Breast cancer with controls caused by several reasons, including the spread of cancer to the liver (liver metastases). Breast cancer may spread to the liver, which results in damage to liver cells and the release of liver enzymes such as AST into the bloodstream. The effect of chemotherapy, some chemotherapy medications used to treat breast cancer, may affect the liver. This leads to increased levels of the AST enzyme due to stress or liver damage. It can also be caused by inflammation or injury in the liver. Women with breast cancer may have other conditions that affect liver health, such as hepatitis, or they may take medications that put stress on the liver. Oxidative stress and inflammation result from the tumor. Breast cancer causes an inflammatory state throughout the body, increasing oxidative stress and affecting liver function, which may result in a higher AST. Obesity or metabolic syndrome, a prevalent condition that can result in nonalcoholic fatty liver disease (NAFLD), causes elevated liver enzymes [15].

Alanine aminotransferase* (ALT) Patients with breast cancer had significantly higher serum (ALT) levels than the control group ($P < 0.05$). High ALT levels in women with breast cancer may reflect several factors. It is believed that ALT is released in large quantities in response to cancer and breast inflammation-induced stress. It could also indicate the effect of cancer on the cardiovascular system. Hormonal changes occurring in the body elevate the level of alanine aminotransferase in women with breast cancer. Estrogen and prostaglandins, in particular, can influence this increase. These hormones play a significant role in regulating the menstrual cycle, which can be affected by breast cancer [16].

Albumin*; The albumin table (1) showed substantial rise at the ($P < 0.05$) probability threshold in albumin levels in the serum of patients with breast cancer, with high albumin control in female breast cancer patients The result may be due to several factors, including: Inflammation of the glandular components Inflammation of the glandular components can lead to an increase in albumin levels Inflammation Breast swelling may occur as a result of cancer Hormonal changes Hormonal changes related to treatment or the disease itself may affect breast tissue leading to increased albumin levels. Fluid Excess fluid in the breast may be a result of inflammation or swelling which can lead to increased albumin levels Inflammation and infection, when inflammation occurs in the body, the liver produces more albumin as part of the inflammatory response In the case of breast cancer, there may be inflammation in the surrounding lymph nodes or the breast tissue the surrounding lymph nodes or the breast tissue.. Treatment effects Some chemotherapy or radiation treatments can cause changes in liver function, which may increase albumin production changes in body needs Breast cancer can change the body's needs for nutrients and proteins In some cases, the body needs more albumin to support damaged tissue or rapid cell growth Comorbidities Sometimes, other diseases associated with breast cancer can contribute to elevated albumin levels, such as liver or kidney disease [17].

Total protein* table (1) demonstrated that the total protein levels in the serum of patients with breast cancer had significantly increased at a significance level ($P \leq 0.05$) with chronic inflammation under observation: breast cancer may cause chronic inflammation, result in a rise in the manufacturing of inflammatory proteins (such as cytokines) that affect total protein levels in the blood. In some immune systems, they react in certain situations to cancer by producing large amounts of antibodies (immunoglobulin), resulting in elevated total protein levels. Spread to the liver or affecting its function if breast cancer has affected the liver (through metastasis or functional pressure), this may lead to an increase in the production of certain proteins such as albumin and globulin Cancer treatments some

chemotherapy or hormonal therapies may cause changes in total protein levels due to their effect on protein metabolism or organ function Multiple myeloma (rarely) although it is uncommon, there may be suspicion of other hematological diseases [18].

Alkaline phosphatases (ALP)*; table (1) depicting the data on alkaline phosphatases (ALP) revealed a noteworthy surge in the probability of (P ≤0.05) for higher levels of ALP in the serum of patients with breast cancer compared to controls. Stage and poorer outcomes a higher probability of recurrence is associated with lower ALP activity as well as a worse overall survival percentage for women with breast cancer. Nevertheless, it is still unknown what precise processes underlie the link between ALP and the advancement of breast cancer. Studies on cell lines from breast cancer have revealed that ALP could be involved in controlling the extracellular matrix (ECM) and cytokine expression, as well as cell migration and proliferation, which are all influenced by the tumor microenvironment. Furthermore, ALP might be involved in bone homeostasis. The method by which breast cancer spreads to the bone is intricate, and well in a worse overall survival percentage for women with breast cancer. Nevertheless, it is still unknown what precise processes underlie the link between ALP and the advancement of breast cancer. Studies on cell lines from breast cancer have revealed that ALP could be involved in controlling the extracellular matrix (ECM) and cytokine expression, as well as cell migration and proliferation, which are all influenced by the tumor microenvironment. Furthermore, ALP might be involved in bone homeostasis. The method by which breast cancer spreads to the bone is intricate, involving remodeling, a significant step in the disease's progression [19].

Bilirubin*; Table 1 revealed a significant rise in bilirubin levels in breast cancer patients' serum as compared to the control group at the P ≤ 0.05 significance level. The link between serum bilirubin and cancer has emerged in recent years has come to light. Studies on human cancer cells have demonstrated that bilirubin's anticancer effects stem from its capacity to reduce oxidative stress by raising the quantities of free radicals inside tumor cells. Increased reactive oxygen species change gene expression and harm DNA structure; as a result, cell growth is decreased [20].

* The lactate dehydrogenase (LDH)*; table (1) demonstrated a substantial rise in the probability of (P ≤ 0.05). The serum levels of LDH in Breast cancer patients were contrasted with the control group. The findings revealed that an increase in elevation is a predictor of inflammation and tissue damage. It is known to have prognostic value in follow-up for patients with cancer, solid tumors, and hematologic disorders. It is widely known that serum LDH levels in patients with solid tumors and malignant hematologic disorders are measured to assess liver function and monitor for liver disease. It is used as a tool to predict the course of metastatic melanoma and persistent lymphocytic leukemia. It has been proposed that elevated LDH levels in asymptomatic non-Hodgkin lymphoma patients are a sign of relapse. Elevated LDH levels are also a significant contributing factor to deciding on a suitable course of treatment. Nevertheless, the fundamental process connecting LDH to diminished survival remains to be elucidated. It has been proposed that the degree of hypoxia in tumor cells may be reflected in the serum LDH level. Because tumor cells proliferate so quickly, they typically suffer from oxygen deprivation. In creating Anaerobic respiration is a process that cancer cells can use to generate energy [21].

*Gamma-glutamyl trans peptidase (GGT); Table 1 shows a significant increase in gamma-glutamyl trans peptidase (GGT). The likelihood of finding a value for GGT in the serum of breast cancer patients that is less than 0.05 probability units below the control value is high. Numerous theories have been put forth regarding GGT's involvement in carcinogenesis. The enhanced GSH catabolism brought on by elevated GGT activity is one of these;

GGT's breakdown of extracellular GSH yields cysteine, a rate-limiting amino acid. for the cell's production of GSH. Consequently, GGT is crucial for maintaining cysteine homeostasis and GSH. GSH controls neoplastic transformation, cell viability, and shields cells from carcinogens. Because of its reducing qualities, GSH can stop lipid peroxidation, inactivate carcinogens, shield DNA from harmful free radicals, and preserve the integrity of various tissues. However, cysteine glycine, a highly reactive and carcinogenic molecule, is a byproduct of GSH's extracellular breakdown via GGT [22].

The prothrombin time (PT)* table (1) showed a significant increase in probability ($P \leq 0.05$). The relationship between the levels of PT in the serum of patients with breast cancer and the control group is examined. Thrombin and Breast Cancer Increased Risk of Clotting: Studies have found that women with breast People with cancer are more likely to develop blood clots. Thrombin can affect survival. survival in women with breast cancer because blood clots can lead to serious health problems. Effects. In terms of quality of life, thrombin can have an impact on the lives of women with breast cancer by causing blood clots can lead to health problems and side effects (23).

The BMI* table (1) revealed a notable rise in the probability of BMI levels reaching certain thresholds ($P \leq 0.05$). serum in patients with breast cancer, controls, and hormone therapy. Hormone Breast cancer is often treated with therapies such as tamoxifen or aromatase inhibitors. These drugs may lead to weight gain due to their effect on metabolism or body fat distribution. Changes in physical activity, illness, and its treatments, such as surgery, chemotherapy, or radiation, may reduce physical activity due to fatigue, pain, or depression, which increases the risk of weight accumulation. Metabolic changes: Breast cancer can cause changes in fat and carbohydrate metabolism, leading to increased fat storage, especially as the disease progresses due to Medications used to treat it can also contribute to weight gain. Insulin resistance associated with obesity or hormones can also contribute to weight gain, increased appetite, and changes in eating habits. weight gain, increased appetite, and changing eating habits. Some women may experience increased appetite due to stress or medication side effects. This may lead to increased calorie consumption. Treatments such as chemotherapy can cause fluid retention in the body. This can contribute to weight gain and temporarily raise BMI. Effects of Age and Menopause in Older Adults. Women with breast cancer, especially after menopause, often experience hormonal changes that These changes can lead to the accumulation of abdominal fat and an increase in BMI. Anxiety and Psychological stress resulting from a cancer diagnosis and treatment may lead to eating disorders, such as emotional eating, which contributes to weight gain (24,25).

As shown in Table 2, the group aged 55-75 years has genetic mutations, which are changes in genes that can be acquired or inherited and raise the chance of developing breast cancer. BRCA1 and BRCA2 are two genes that influence the risk of breast cancer. The risk of ovarian cancer is also raised by mutations in these genes. A hereditary genetic mutation may be the cause of up to 10% of breast tumors, including such as those found in the genes BRCA1 or BRCA2. Breast cancer risk rises with prolonged exposure to reproductive hormones. For this reason, women who have late menopause after the age of 55 or early menstrual periods before the age of 12 are more vulnerable. More connective tissue than fatty tissue is typically found in dense breast tissue. Because of this thick tissue, tumors may be hard to spot on a mammogram [26].

The results in Table 3 revealed that. There are several reasons for this. They lead to a first, during the menstrual period, women face a heightened risk of developing breast cancer compared to other times in their lives. The effects of estrogen during menopause are as follows: Estrogen plays a role in the growth of mammalian cells, and increased estrogen levels can

raise the chance of developing cancer. Biological causes: Breast cells change during menstruation, increasing the risk of developing breast cancer. Increased vascular growth The breast experiences increased growth of blood vessels This can raise the chance of developing cancer. genetic reasons, alterations to the genes BRCA1 and BRCA2. Breast cancer risk is higher in women who have mutations in these genes during menstruation Other genetic influences Other genetic changes can These changes can lead to an increased risk of cancer because hormonal changes can affect estrogen levels Progesterone levels during menstruation are important to consider, along with estrogen and progesterone levels The growth of mammalian cells and an increased risk of cancer are both caused by changing hormones. Developing cancer. Environmental causes: Exposure to adverse environmental factors: Exposure to radiation and chemicals can increase the risk of cancer. raise the chance of developing cancer. One major worry is the possibility of developing cancer [27,28]. It has been observed that lifestyle factors, including poor diet and inactivity, can also contribute to the condition. Cancer risk may also be increased by family history. Age: Cancer risk rises as one ages. Cancer may be impacted by obesity. Histologic results: Individuals with severe cirrhosis and fibrosis in nonalcoholic fatty liver disease [29].

The results from this table highlight the impact of chemotherapy on multiple biochemical parameters. There is a significant increase in ALT, AST, ALP, and bilirubin levels ($p < 0.05$) among patients receiving chemotherapy, suggesting potential hepatotoxic effects of treatment. Elevated GGT and LDH levels suggest increased oxidative stress, and Metabolic alterations in these patients are important to note. Additionally, the observed decrease in albumin levels could be attributed to liver dysfunction and increased metabolic demand [30]. Notably, BMI was higher in patients receiving chemotherapy; this may be a sign of weight gain due to the treatment's metabolic disturbances related to disease progression. These findings underscore the need for continuous monitoring of liver function and metabolic health in breast cancer patients undergoing Potential complications can be mitigated and the overall treatment improved by chemotherapy [31].

This table provides a comparison of how different breast cancer treatment modalities affect liver function and metabolic markers. Chemotherapy patients exhibited the highest levels of ALT, AST, ALP, and Bilirubin, indicating substantial liver stress, likely due to hepatotoxic effects of chemotherapeutic agents. GGT and LDH levels were also significantly elevated, reflecting increased oxidative stress and potential liver cell damage. The decrease in albumin levels among chemotherapy patients suggests compromised liver synthetic function, which can result in fluid retention and other metabolic complications [32,33]. Patients receiving hormonal therapy showed moderate increases in liver enzymes, but not as severe as chemotherapy. This suggests that while hormonal treatments impact liver function, they are less hepatotoxic compared to chemotherapy. Targeted therapy patients displayed enzyme levels between those of chemotherapy and hormonal therapy groups, suggesting a milder but notable impact on liver function[34] The BMI values suggest that chemotherapy patients had a slightly higher BMI, which could be due to metabolic alterations, treatment-induced weight gain, or water retention These findings reinforce the need for frequent liver function monitoring and personalized treatment strategies to mitigate hepatic damage in breast cancer patients receiving different therapies[35].

Moral considerations: The Cancer and Nuclear Medicine Hospital gave its approval for this study, and samples were gathered in compliance with the moral guidelines for medical research. Before the sample was collected, each subject gave their knowledge and agreement. Participants were given assurances that the data they submitted would be kept confidential and utilized exclusively for scientific purposes.

Table 2: Effect of age on Biochemical variables related to liver function in Women with breast cancer and Control

Biochemical parameters	Age group (Mean ± Standard Deviation)					
	Age group (15-34)		Age group (35-54)		Age group (55-75)	
	Control (n=7)	Patient (n=10)	Control (n=7)	Patient (n=14)	Control (n=8)	Patient (n=14)
Alanine aminotransferase (ALT)	18.23±4.8	23.88±5.7	19.5±5.17	28.9±6.9	21.66±5.66	32.45±9.21*
Aspartate aminotransferase (AST) (mg/dl)	19.68±5.31	24.38±6.45	18.32±5.32	29.11±6.99	22.93±6.33	37.55±7.39
Alkaline phosphatases (ALP)(U/L)	73.8±10	188.6±32.22	123.3±14.76	200±45.24	149.44±23.56	354.89
Bilirubin (mg/dl)	0.98±0.37	1.5±0.33	1.0±0.40	2.8±0.47	1.38±0.47	3.98±0.33
Albumin (g/l)	3.34±1.0	4.44±1.34	3.87±1.15	4.98±1.92	3.95±1.2	5.87±2.11
Total protein (mg/dl)	6.46±1.58	7.38±1.15*	5.99±1.47	6.45±1.28*	6.76±1.83	7.864±1.54*
Gamma-glutamyl transpeptidase (GGT) mg/dl	17.27±2.9	78.58±10.8	19.67±3.66	95.34±12.9	25.27±4.75	114.23±19.1
Lactate dehydrogenase (LDH) mg/dl)	58.34±10	88.42±22	79.48±12	130.67±14.88	89.76±13.2	188.42±22
Prothrombin time (PT)	0. 4±0.04	0.8±0.2	0.5±0.010	1.9±0.34	0.6±0.1	2.2±0.37
BMI (kg/m2)	24.48±4.69	26.57±5.51*	26.70±5.88	29.60±6.49*	28.44±6.22	33.20±6.67*

Table 3: Effect of Women During Menstruation and Menopause on Levels of Some Vital Body Variables in a Healthy State Compared to Patien

Biochemical parameters	Groups (Mean ± Standard Deviation		
	Women during menstruation(n=20)	Women during menopause(n=15)	p-value |
Alanine aminotransferase (ALT) (mg/dl)	35.44±4.22*	26.9±2.99	<0.05
Aspartate aminotransferase (AST)(mg/dl)	43.62±5.72*	30.83±4.43	<0.05
AL kaline phosphatases ALP U/L	320.49±66.12*	188 ±28.7	<0.05
Bilirubin(mg/dl)	3.78±0.47*	1.5±0.33	<0.05
_Albumin(g/l)	6.50±1.43*	4.70±0.45	<0.05
Total protein(mg/dl)	10.22±2.22*	8.54±1.2	<0.05
Gamma-glutamyl trans peptidase (GGT) mg/dl	96±34.44*	70.27±2.9	<0.05
Lactate dehydrogenase LDH (mg/dl)	184.93±28.6	128.42±22	<0.05
Prothrombin time PT	2±0.34	0.8±0.2	<0.05
BMI (kg/m2)	36±8.22	25.8±5.32	<0.05

Table 4: The Impact of Chemotherapy on Liver Function Markers

Biochemical parameters	Groups (Mean ± Standard Deviation)		
	Patients Receiving Chemotherapy(n=22)	Patients Not Receiving Chemotherapy (n=13)	p-value
Alanine aminotransferase (ALT) mg/dl)	50.3 ± 6.5*	40.2 ± 5.8	<0.05
Aspartate aminotransferase (AST)(mg/dl)	55.1 ± 7.2*	45.3 ± 6.4	<0.01
AL kaline phosphatases (ALP) U/L	370.5 ± 50.1*	310.2 ± 42.3	<0.01
Bilirubin (mg/dl)	2.4 ± 0.33*	1.9 ± 0.22	<0.05
Albumin (g/l)	3.7 ± 0.34*	4.8± 0.47	<0.05
Total protein(mg/dl)	7.8 ± 1.2*	6.9 ± 1.0	<0.05
Gamma-glutamyl trans peptidase (GGT) (mg/dl)	110.3 ± 12.7*	90.2 ± 10.5	<0.01
Lactate dehydrogenase LDH (mg/dl)	265.4 ± 25.3*	220.7 ± 20.8	<0.01
Prot hrombin time PT	2±0.34*	0.6±0.2	<0.05
BMI (kg/m2)	34.1 ± 3.8*	30.5 ± 4.2	<0.05

Table (5) Impact of Medications on Liver Function and Other Biochemical Parameters

Biochemical parameters	Groups (Mean ± Standard Deviation)		
	Hormonal Therapy(n=11)	Targeted Therapy(n=10)	Chemotherapy (n=14)
Alanine aminotransferase (ALT) mg/dl)	42.8 ± 5.9	45.1 ± 6.2	50.3 ± 6.5*
Aspartate aminotransferase (AST)(mg/dl)	48.7 ± 6.3	50.2 ± 6.8	55.1 ± 7.2*
AL kaline phosphatases (ALP) U/L	320.4 ± 47.5	330.7 ± 49.1	370.5 ± 50.1*
Bilirubin(mg/dl)	2.0 ± 0.3	2.1 ± 0.3	2.4 ± 0.4*
Albumin(g/l)	7.5 ± 1.0	7.7 ± 1.1	7.8 ± 1.2*
Total protein(mg/dl)	4.1 ± 0.5	4.0 ± 0.5	3.9 ± 0.5*
Gamma-glutamyl trans peptidase (GGT) (mg/dl)	100.2 ± 11.4	105.6 ± 12.1	110.3 ± 12.7*
Lactate dehydrogenase LDH (mg/dl)	245.6 ± 22.3	250.8 ± 23.1	265.4 ± 25.3*
Prothrombin time PT	12.8 ± 1.1	13.1 ± 1.2	13.5 ± 1.3*
BMI(kg/m2)	31.8 ± 3.6	32.5 ± 3.8	34.1 ± 3.8*

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