## SINDH UNIVERSITY RESEARCH JOURNAL (SCIENCE SERIES)

## Study of some Hematological parameters as Biomarker for breast Cancer population of Sindh

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**Abstract:** Cancer is the second largest killer worldwide, Breast cancer is one of the most widespread diseases affecting women. The prevalence of breast cancer is increasing gradually in developing countries. Especially, the Pakistani women are more victim of breast cancer among the Asian population. Incidence of breast cancer of Pakistani population is 2.5 times higher than the neighboring nation. There are various factors which play a role in development of breast cancer, majorly are environmental and genetical. The aim of present study was to analysis the association and variation in hematological parameters of breast cancer patients. The study was conducted at Medical Research Centre, Liaquat University of Medical & Health Sciences, Jamshoro. In this study 80 breast cancer patients were selected for hematological parameters. The patients mostly involved in this study were above 40 years. The questionnaire used in this study designed was to know the age, marital status, duration of the disease, diet habits, physical exercise, and duration of feeding, family history and mode of treatment. Blood samples were collected from the participating members of the breast cancer patients after an informed consent was signed. The incidence of breast cancer was found high at the age above than 40 years woman and less than 60 years. The peak age group for the occurrence of breast cancer in Sindh`s females was 45-55 years. Breast cancer was not found in underweight the women. Number of WBC and RBC decreased in the cancer patients than the normal range. Our study suggested that the BMI, ESR, and Hematological parameters especially Lymphocyte and Neutrophils are as important tools for diagnosis of stage and monitoring of breast cancer.

**Keywords:** Breast Cancer, Pakistani Women, Abnormality

## 1. INTRODUCTION

Carcinoma of the breast is the second commonest malignancy affecting half a million women worldwide each year. It is one of the major causes of death among women between 40 and 44 years age group that has become a genuine public health problem (Seema 2015). The incidence of breast cancer increases with age, being uncommon below the age of 32 years; however its behaviour varies from slow to rapid progressive disease despite available treatment. Carcinoma breast is commonest cancer in urban and rural females (Gaurav *et al*., 2008 and National Cancer Registry Program 2011). Breast cancer incidence is increasing in all regions of the world with majority of rise seen in developing countries (Globocan 2008). The incidence of breast cancer in Pakistan is 2.5 times more than neighbouring countries while India and Iran have high incidence of breast cancer after Israel (Liede *et al.,* 2002). In any kind of abnormality and severe disease (like cancer, heart disease), directly effect on blood parameters therefore it is essential to identify the major variation in biochemical and hematological parameters for early diagnosis of cancer and other diseases especially in chemotherapy. It is very crucial to check these parameters at regular bases during the treatment. Complete blood count (CBC) is a prerequisite

investigation for breast cancer patients before the use of any treatment (Liqaa *et al*., 2014). Complete blood count is a prerequisite investigation for breast cancer patients before the use of any treatment (Akinbami *et al*., 2013). The blood chemistry panel (BCP) measures the levels of chemicals, enzymes, and organic waste products found in the blood. It determines the healthiness and proper functioning of various organs during chemotherapy treatment. The abnormal blood chemistry results also suggest the spread of breast cancer to the bone, kidney or liver. Only a few studies have investigated the associations of liver function tests (LFTs) and kidney function tests (KFTs) with mortality in breast cancer (Wyld *et al*., 2003 and Brown *et al*., 2012).

Biochemical and Hematological (CBC) parameters provide the information about different enzymes, biomolecules, blood cell (white blood cell and Red blood cell) and platelets. Complete blood picture provide the information of health consultants to check symptoms of disease such as pain, fatigue, weakness or any symptom. CBC is also very helpful in the diagnosis of many other diseases (Liqaa *et al*., 2014). Obesity (BMI of C30 kg/m2) was associated with a difference in tumor detection and stage of cancer. If premenopausal obesity is protective, then this may explain the shift in

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incidence of breast cancer among obese women into an older age group. A more logical explanation would relate to the increased prevalence of obesity as age (Shields *et al*., 2011). A large number of observations suggest that certain types of inflammatory cells are not innocent bystanders at breast tumor sites, and that they actively affect tumor development and progression. Inflammatory cells, primarily macrophages, may affect these processes via their ability to express a large variety of factors, including inflammatory cytokines (Ben-Baruch *et al*., 2003). Cancer is spreading day by day throughout the World; Asian countries are more victims to cancer in this era especially Pakistan has more alarming condition regarding breast cancer, while breast cancer was uncommon few years back in Pakistan, but now breast cancer is most common carcinoma found in Pakistani female, it accounting 34.6% in female carcinoma (Bennett *et al*., 1995).

## 2. **MATERIALS AND METHODS**

Thiscross sectional study of common haematological parameters serves as biomarker of breast cancer patients for the population of Hyderabad Sindh was performed at Liaquat University of Health sciences, Jamshoro during the year 2015-2016. 80 female were selected who were diagnosed breast after taking consent form. And 40 healthy individual of the same age were selected for control. The questionnaire were designated which showed patient's personal and family history, about occupation and name hospital where she was going for treatment, kind treatments and duration of treatment and duration of disease, age at the time of cancer diagnosed, how she diagnosed her disease etc. We calculated their body mass and height in meters for analysis of body mass index (BMI). Body mass index is equal to total mass of body in kg divided by height$^2$ in meters. Blood samples were obtained from antcubital vein of upper limbs of each patient. The blood was collected from patients and control into EDTA bottle and 0.6 ml in sodium citrate vials for the estimation of erythrocyte sedimentation rate (ESR). Blood cell was analyzed few minute after the blood collection because of chances of haemolyses. The data were analyzed on statistical software SPSS.16.

## 3. **RESULTS**

This study shows the hematological parameters among the breast cancer population of Sindh. Hematological parameters play very important role for diagnosis of different type of diseases. Any type of cancer or any other disease directly affect haematological or biochemical constituent of blood. Our study results showed that Breast cancer is common in married women, table 01 show that 91.66% of cancer was found in married women while 8.33% was found in unmarried women. 55% of breast carcinoma was found in Sindhi women while 25% seen in Urdu speaking women **(Fig. 1)**. The literacy rate of effected women was 28.33%, while majority of patients were illiterate. The survey concern with age relationship of breast cancer population of Sindh shows that Breast carcinoma is mostly found in older women having age above then 40 years. The mean and standard deviation of patients was 45.6±11.07.The results are summarized in table 2. Current study revealed that 61.67% of women have age less than 50 years whereas 38.33% women have age above than 50 years. Few cases were also seen with age less than 35 years.Breast cancer was mostly found in obese women but it decreased due to use of chemotherapy and radio therapy, we collected samples during different stages of treatment. The **(Table 2).** showed that the BMI of cancer patients and control, mean and standard deviation of BMI of cancer patients 24.67%. The BMI is slightly high in cancer patients as compared to the control. The RBC was found low in cancer patients as compare to control, the percentage of RBC in control group was found 4.73±1.2 whereas in carcinoma patients seen 4.32±0.64 with significant difference (p-value < 0.01), While white Blood Cell count were recorded a lower in all the age groups than the control, the mean and std value of cancer patients 5.84±1.64 while the control have 7.13±2.8 with (p-value 0.005) shown in table 03. The monocytes and lymphocytes count found high as compared to the control group with significant level 0.006. The mean value of monocytes was found 16±4.73 which is higher than control 8.4±4.6,also the mean and standard deviation of total lymphocytes count of test group 35.42±8.26 was higher than the control group 19.85±1.62 with (p value 0.001).The mean of Erythrocyte Sedimentation Rate (ESR) of the breast carcinoma patients were significantly high as compared to control group, with significant level (p value <0.005), illustrated in **(Table 3).**

**Table 1: Demographic Characteristics**

| | | |
|---|---|---|
| Marital status | Unmarried | 8.33% |
| | Married | 91.66% |
| Ethnicity | Sindhi | 55% |
| | Urdu | 25% |
| | Other | 20% |
| Literacy difference | Literate | 28.33% |
| | Illiterate | 71.66% |

**Table 2 :Body mass index and age of subject and control.**

| Variable | Breast cancer patients | Controls |
|----------|------------------------|----------|
| AGE | 45.6±11.07 | 40.25±10.03 |
| BMI | 24.67± 4.85 | 23.28±2.37 |

**Table 3: Hematological parameters of women breast cancer patients**.

| Variable | Breast cancer patients | Controls | P Value |
|----------|------------------------|----------|---------|
| Number of RBCs X $10^3$/µL | 4.32±0.64 | 4.73±1.2 | 0.001 |
| Number of WBCs X $10^3$/µL | 5.84±1.64 | 7.13±2.8 | 0.005 |
| Monocytes (%) | 16±4.73 | 8.4±4.6 | 0.002 |
| Neutrophils (%) | 65.71±9.00 | 45.64±7.42 | 0.006 |
| Lymphocytes (%) | 35.42±8.26 | 19.85±1.62 | 0.001 |
| ESR mm/hr | 19.65±7.34 | 7.28±1.64 | 0.005 |

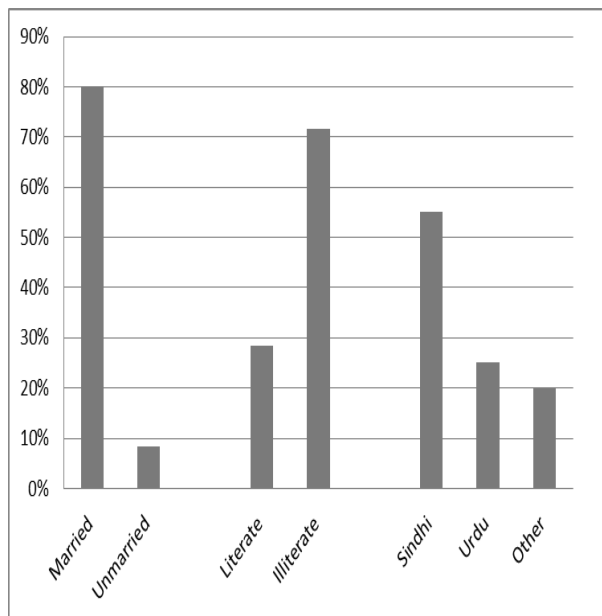*Values expressed as Mean ±SD, P value <0.05 was considered as significant.



**Fig. 1 Demographic data showing the marital status and literacy rate among the breast cancer population of Sindh.**
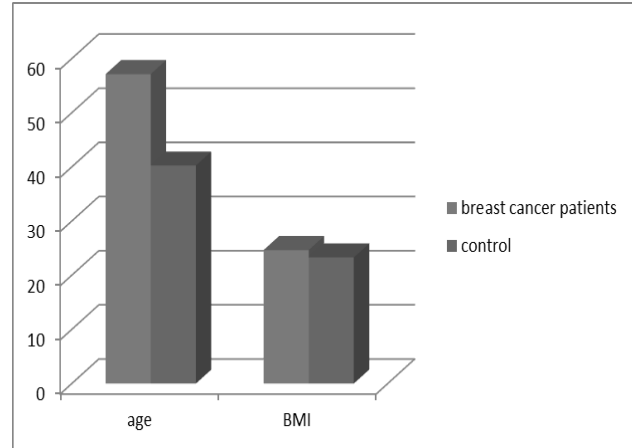


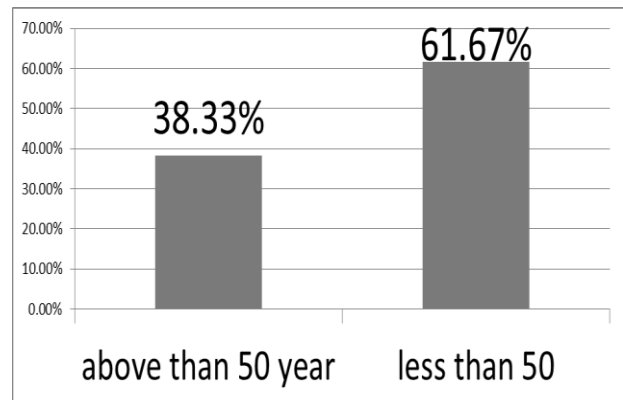**Fig. 2 Compression of age and body mass index between the subject and control.**



**Fig. 3 Distribution of age of breast carcinoma patients**

## 4. DISCUSSION

Hematological parameters are frequently used in routine test for the diagnosis of many diseases, such as infections, anemia, allergy, immune disfunctions, cancer and numerous other diseases. Breast cancer is mostly seen in older women having age above then 45 years, our study revealed that 61.67% of women have age less than 50 years whereas 38.33%women have aged above than 50 years. According to Binder-Foucard et *al*., (2013) reported that increase in the age increases the chance of incident of breast cancer in women, 50% of breast cancer was found above than 60 years age women and 30% were found more than 70 years old women. According to American Cancer Society (2011) the median of breast cancer patients was observed 61 year during the 2008 to 2012. That indicates breast cancer mostly develops in above than 50 years age. The median age 58 for black women and 62 years for white women (for American women). But in our study few cases were also seen that age less than 35 years. Presence any type of cancer in family history is high risk of breast cancer especially for blood relatives. 31.66% was observed with breast cancer that had at

least a blood relative was diagnosed with breast cancer (Rosner *et al*., 1994). Present study showed the breast cancer is common in married women. According to Hunter *et al*., (1997) breast cancer risk is high in unmarried women as compare married women at same stage of age and also in married nulliparous women. Long-time circulation of oestrogen in women body increase the risk of breast cancer in women, greater number of menstrual cycles increases the risk of breast cancer, simply early age of menarche and later age of menopause increase the risk of breast cancer in women. According to research of University of Southern California, the younger women before the age of menopause breast feeding was associated with breast cancer increase. The duration of breast feeding decrease the risk of breast cancer in younger women (Bergstrom *et al*., 2001). Body mass index of breast cancer patients was observed slightly increase as compare to normal $24.67\pm4.85$. According to new advanced research 3% increase in the risk of Breast cancer in women with the increase of 1 kg/m2 body mass index(BMI)( Van den Brandt *et al*., 2000).Among the postmenopausal women increase the risk of breast due to increase in body mass index (BMI) (IARC 2002). BMI is high in pre and postmenopausal breast cancer patients than controls but showed insignificant difference (Timothy *et al*., 2003). The investigation revealed an elevation peak at the benign status of metastasis. Variation in hematological parameters in breast cancer patients may be due to the increase in the levels of pro-inflammatory cytokines including Interlukin-I and Interlukin-6 and Tumor necrosis factor-α. (Liqaa *et al*., 2014). Ufelle, *et al*., 2012) reported that the hematocrits are significantly reduced in pre- and post- surgery of breast cancer patients. Current study reflects that the RBC level of breast cancer patients is 4.32X $10^3/\mu L$ which is lower than control group. Ulrich *et al* (2010) and Castro *et al*., (1987) reported that cancer patients above 40 years have low RBC count as compare to healthy control this low level of RBC associated with immunosuppression and bone marrow suppression (BMS). Our study results of WBC are significantly reduced in the breast carcinoma patients as compared to control. Miller *et al*., (1988) and Beresford *et al*., (2006) identified that reduced level of blood count may be result of chemotherapy and thrombocytopenia seen in many malignancies. The percentage of monocytes and lymphocytes and neutrophils were significantly high in present study. Feng *et al*., (2011) reported that the percentage of monocytes highly increased in breast cancer patients. Hornychova *et al*., (2008) demonstrated that the monocytes and lymphocytes play a key role in immune system in the response of inflammation and associated with several malignancies such as breast carcinoma, while Chew *et al*., (2012) and Wilcox *et al*., (2011) reported that high level of monocytes and lymphocytes

prognosis of nasopharyngeal carcinoma and lymphoma. Thavaramara *et al*., (2011) described that the level of neutrophil, leukocyte and neutrophil leukocyte ratio (NLR) were high in subject as compared to the control. Our study result revealed that the Erythrocyte Sedimentation Rate (ESR) is much greater than the control. Akanni *et al*., (2013) concluded that the high ESR level is the indication of breast cancer and this parameter is very useful for diagnosis and treatment of cancer.
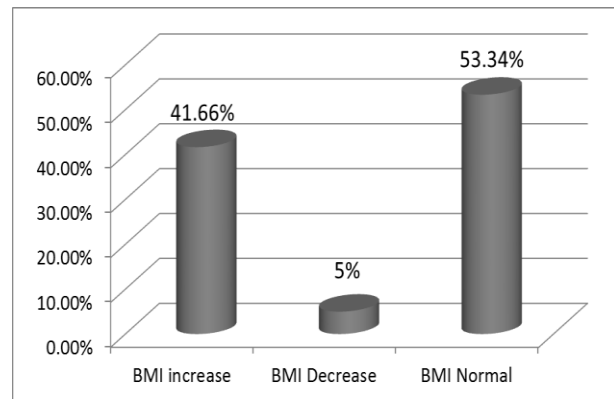


**Fig. 4 levels of BMI value of cancer patients**

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