

SURVEILLANCE OF BLOOD CHEMISTRY IN BREAST CANCER PATIENTS BELONGING TO PUNJAB, PAKISTAN

A. Khalid¹, A. Qadir¹, N. A. Abbasi^{1*}, N. Jamil¹, M. B. Shakoor¹ and S. R. Ahmad¹

¹College of Earth and Environmental Sciences, University of the Punjab, Lahore, Pakistan

*Corresponding author: meetanam@yahoo.com

ABSTRACT: Cancer is known to be second largest killer worldwide. In various types of cancer, the incidence rate of breast cancer has increased steadily in women. Any abnormality especially cancer has a direct impact on all the blood parameters so it is crucial to assess the variation in haematological and biochemical parameters. The aim of present study is to analysis the association and variation in haematological parameters among breast cancer patients. A cross-sectional study was accomplished in line with the research regulations, ssociodemographic survey was done to collect the covariates. The blood samples were collected from 16 districts of Punjab, Pakistan. Population selected for this study included 40 breast cancer patient and the written consent was also obtained from all the individuals. After collection the samples were transported to Department of Pathology, Mayo hospital, Lahore for the laboratory analysis. The study revealed that majority of the subjects were of 48-57 years old (N=12(30%) with weight ranging from 64 kg to 74 kg (N=14(35%) and height from 5.01 ft to 5.50 ft (N=23 (57.5%). All the sociodemographic, clinical, biochemical and haematological characteristics were analyzed by ANOVA test with *P* value 0.05 and the test revealed that all the parameters are statistically significant except duration of marriage *P* = 0.085 and blood urea *P* = 0.099. In conclusion, study reveals that biochemical parameters are an important diagnostic tool in disease monitoring. Moreover, awareness campaign regarding breast cancer should be carried out and more research should be done to observe the pattern of other haematological parameters.

Key words: breast cancer, population, sociodemographic, clinical, biochemical

(Received 11.07.2023

Accepted 12.09.2023)

INTRODUCTION

Cancer is one of the diseases in which uncontrolled abnormal growth of cells occur, which further invade the tissues (Peate, 2018; Ali *et al.*, 2014). The cancer cells in the breast tissues which are in the form of lobules and ducts is known to be breast cancer (Das *et al.*, 2021). In men it is very rare but in women it is common and considered to be second largest killer globally among the ages of 20 and 50 years (Khan *et al.*, 2017) and the most prone age group is between 40 and 44 years (Seema 2015). Annually, more than 315,000 deaths in women are caused by breast cancer, having significant progress during the treatment and diagnose (Schneider *et al.*, 2014; Osaro *et al.*, 2018; American Cancer Society, 2019). Over the past 40 years, the incidence rate of breast cancer has increased steadily (Jemal 2003) all over the world but majority of rise is seen in the developing countries (Globocan 2008). Currently, 1 in 4 women is diagnosed with breast cancer globally (Bray *et al.*, 2018) and is said to be commonest cancer in rural and urban females (Gaurav *et al.*, 2008 and National Cancer Registry Program 2011). Among the Asian population, women of Pakistan have more threat of having breast cancer and the incidence rate is about 2.5 times greater than Iran and India (Asif *et al.*, 2014; Khan *et al.*, 2017).

Furthermore, Pakistan has the highest incidence rate of breast cancer in Asia continent except the west bank of Palestine. Even though, the incidence rate of breast cancer is still less than the western countries (Fitzmaurice *et al.*, 2017). Over the period of time, incidence of breast cancer has increased in Pakistan and it is observed that 1 in 9 women in Pakistan get diagnosed with carcinoma breast (Sohail *et al.*, 2007; Zaheer *et al.*, 2019).

Any abnormality especially cancer has a direct impact on all the blood parameters so it is crucial to assess the variation in haematological and biochemical parameters. These parameters provide information regarding types and count of blood cells specifically red blood cells, platelets and white blood cells. In the treatment of breast cancer, Complete blood count (CBC) is considered to be prerequisite investigation and is helpful for the diagnosis of various diseases (Liqaa *et al.*, 2014; Akinbami *et al.*, 2013). Physicians found CBC useful to check any symptoms in patients regarding fatigue and bruising (Ali *et al.*, 2014). Blood chemistry panel basically determines the proper functioning and healthiness of various organs during treatment (Chauhan *et al.*, 2016). The abnormal blood profile also implies the spread of carcinoma breast to the kidney, bone or liver. There are only few studies which have associated the liver and kidney function tests (LFTs and KFTs) with the

breast cancer (Wyld *et al.*, 2003 and Brown *et al.*, 2012). Sodium, calcium and potassium are the electrolyte that regulates the physiological functions. Electrolyte concentration should be within limits, excess or insufficiency can be dangerous and in some individuals fatal (Tietzel *et al.*, 2008). Serum electrolyte is a test to check the levels of these ions in the human body and its disorder is commonly encountered with cancer (Rosner & Dalkin, 2014; Bowman, 2017).

One of the leading health challenges is obesity and it is related to increase in risk of cancer (Lega and Lipscombe, 2020). Approximately 20 % of all tumor types are attributed to obesity and causes 20% death in women due to cancer and 14 % among men (Zhang *et al.*, 2016; Goodwin & Chlebowski, 2016). Almost 6-19% of all cancer patients having chemotherapy are obsessed (Grueso *et al.*, 2019) the relationship between obesity and risk of developing cancer is casual (Renehan *et al.*, 2015). It has been reported in previous studies that obesity such as the body mass index (BMI) of $\geq 30.0 \text{ kg/m}^2$ affects negatively on cancer progression, survival and mortality (Gomez *et al.*, 2021, Goodwin & Chlebowski, 2016; Renehan *et al.*, 2015; Wolk *et al.*, 2001). BMI can also be correlated with a difference in the detection of tumor and cancer stage (Khan *et al.*, 2017). BMI is often used as a screening tool to decide if your weight might be putting you at risk for health problems such as heart disease,

diabetes, and cancer. The aim of present study is to analysis the association and variation in hematological parameters among breast cancer patients. The clinical assessment included complete blood profile (CBC), liver functioning test (LFT), kidney functioning test (KFT) and serum electrolyte. Findings of the current study will potentially enhance the better management and follow up of breast cancer patients.

MATERIAL AND METHODS

A cross-sectional study was accomplished in line with the research regulations, as well as the approval of the Bioethical Committee of University of the Punjab, Lahore, Pakistan. Furthermore, ethical approval from King Edward Medical University, Lahore was also taken to precede the study. In this study some biochemical and hematological parameters of breast cancer female patients were observed. The samples were collected from 16 districts of Punjab, Pakistan (Figure 1). Population selected for this study included 40 breast cancer patient and the written consent was also obtained from all the individuals. These patients were observed between March 2020 and July 2021. It took a lot of time to do sampling because of the pandemic (COVID-19) condition.

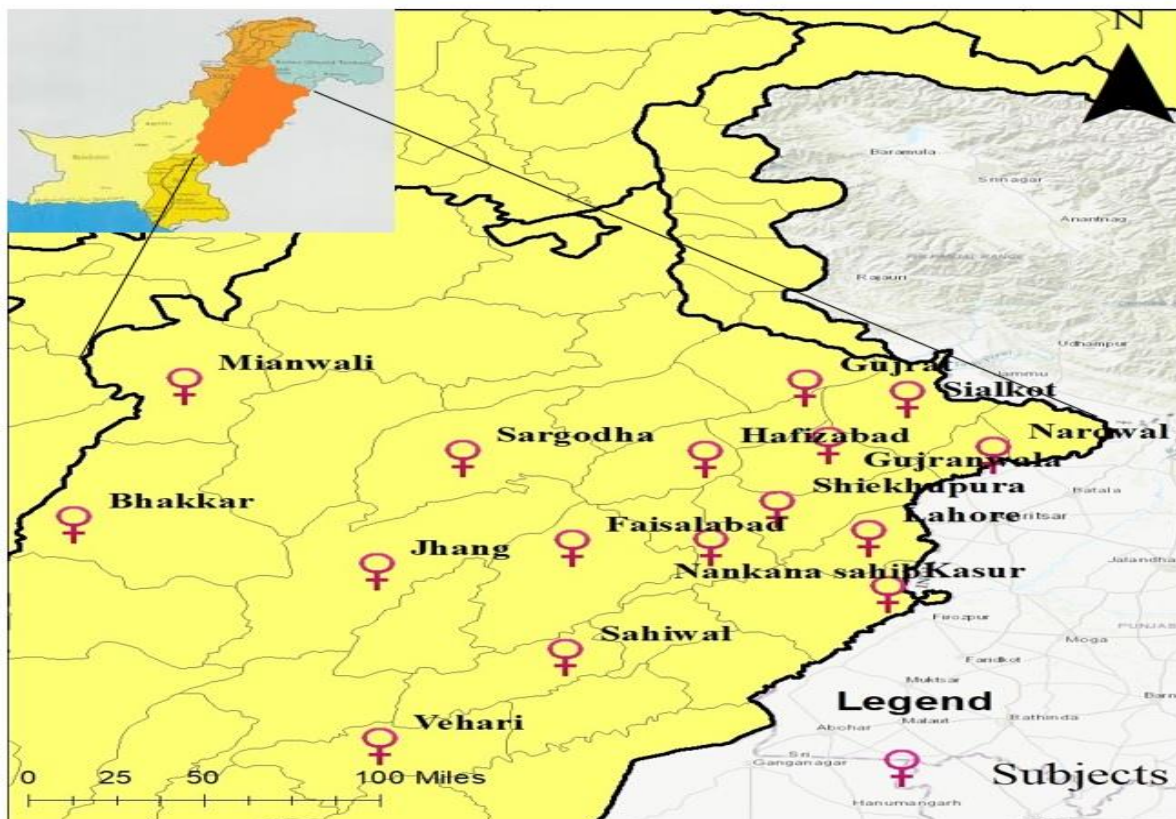


Figure.1. A map showing the locations of areas from where cancer patients were sampled.

Blood Sampling and Analysis: 5ml of blood was collected from 40 patients to test the biochemical and hematological parameters. After collection the samples were transported to Department of Pathology, Mayo hospital, Lahore for the laboratory analysis. Complete blood profile (CBC), liver functioning test (LFT), kidney functioning test (KFT) and serum electrolyte was done. In CBC parameters Hemoglobin, Red Blood Cells count (RBC), Hematocrit (HCT), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH), Mean Corpuscular Hemoglobin Concentration (MCHC), TLC, Platelets, Lymphocytes, Neutrophils, Monocytes, Eosinophils, Basophils were considered. The LFT measured the levels of Alkaline Phosphate (ALP), Total Bilirubin and transaminase (SGPT, SGOT). In KFT Blood Urea and S/Creatinine were assessed. Serum Electrolyte was also evaluated; the level of Calcium, Sodium and Potassium was calculated.

Covariates: Patients' socio-demographic data, including name, locality, district, age, weight, height, marital status, duration of marriage, occupation, educational level, diseases and abnormalities, no. of children, frequency of conceptions, breast feeding behavior and frequency, cooking system, family history regarding breast cancer, eating habits, dairy products, cosmetic usage, exercise habits, knowledge about breast cancer, position of lump, secretions from breast, tumor type, metabolic syndrome and hormonal imbalance, grade of cancer, treatment, precautionary and remedial measures were collected through a questionnaire by each patients. Analysis of body mass index (BMI) was also done by the formula that is:

$$\text{BMI} = \frac{\text{Weight of the individual (Kg)}}{\text{Height}^2 \text{ (m) of the individual.}}$$

Statistical Analysis: All the statistical tests were performed by IBM 22, Origin Pro 2016 and Excel 2013. The results were demonstrated as means $\pm$ standard deviation, range, percentage and ANOVA with $p < 0.05$ that denotes the significant difference between the groups.

RESULTS AND DISCUSSIONS

The current study shows the haematological and biochemical parameters among the breast cancer patients of Punjab, Pakistan. These parameters play a vital role in the diagnosis and treatment of various types of diseases. Any type of disease such as cancer directly affect the biochemical and haematological constituent of blood. The population observed in this study was histologically confirmed patients. A total of 40 female breast cancer patients with age range of 27-67 years were enrolled for the research. Table 1 shows socio-demographic characteristics of breast cancer patients and reveals that majority of the subjects were of 48-57 years old

(N=12(30%)) with weight ranging from 64 kg to 74 kg (N=14(35%)) and height from 5.01 ft to 5.50 ft (N=23 (57.5%)). American Cancer Society (2011) reported that mostly breast cancer develops in patients above 50 years. In another study it was reported that increase in age also increase the chance of breast cancer to occur in women, 50% of women above 60 years had breast cancer (Binder-Foucard *et al.*, 2013; Ji *et al.*, 2020). BMI was also calculated and most of the patients fall in the criteria of overweight, 18(45%). In a previous study it was revealed that with the increase of 1kg/m^2 BMI of women, 3% incident rate of breast cancer increases (Van den Brandt *et al.*, 2000). Cmrecak *et al.*, (2020) stated that the quality of life is affected by obesity and also increases the risk of cancer-related mortality and recurrence.

Hopper *et al.* (2018) reported significant correlation between increase in number of breast cancer patients and BMI, which means that women whose BMI is higher or categorized as obese can be at high risk of breast cancer and these results also align with the results predicted by Elkum *et al.* (2014). The distribution of the breast cancer patients based on locality shows that most of the subjects belong to the urban 27 (67.5%) as well as rural 13 (32.5%) respectively. It can be concluded from this study that cancer basically occurs more in the urban areas than rural areas, similar trend was found in Fei *et al.*, 2015. In another study it is also reported that incidence rates of combined cancers were usually higher in population living in urban areas (Zahnd *et al.*, 2018). The results declared that the breast cancer is more common in the married women 39 (97.5%) as compared to the unmarried 1 (2.5%). This study is similar to Khan *et al.* (2017), in which it is reported that 91.66% married women had breast cancer while 8.33% unmarried had breast cancer. Duration of marriage was also taken into consideration and it was seen that the patients having duration range between 22-28 years (N= 13(32.5%)) were more prone to cancer.

The distribution according to occupation indicated that 1 (2.5%) were maid, 2 (5%) were educationist while the remaining 37 (92.5%) were full time housewives. The educational status of the subjects revealed that 1(2.5%) had master degree, 1(2.5%) had bachelor degree, 3 (7.5%) had intermediate, 7 (17.5%) had matric, 8 (20%) had primary and 20 (50%) had no formal education. The present study literacy rate was found to be similar as Khan *et al.*, (2017) that most of the patients were illiterate. The maximum number of children of the patients observed were 9 (N=1(2.5%)) whereas most of the patient had 4 (N=9 22.5%) children and there were 3 patients who had none. Same trend was observed in the breast feeding behaviour and frequency.

It is revealed in a previous study that more the number of children less will be the risk of breast cancer to occur. It is also reported that women who give birth to five or more children have half the risk of breast cancer

than the women who have not given any birth (Lambe *et al.*, 1996; Babiker *et al.*, 2020). It can be stated because of some evidence that breastfeeding the child for at least a year decreases the risk of both hormones receptor-negative and hormone receptor-positive breast cancer (Ma *et al.*, 2006; Beral *et al.*, 2002). In another study it was concluded that to prevent cancer breast feeding is useful but in some studies this statement was denied by reporting that lactation does not play any role in reducing breast cancer risk (Lipworth *et al.*, 2000).

Most of the patients 29 (72.5%) were using Sui Northern Gas for cooking food, other cooking system were LPG 2 (5%), wood burning 5 (12.5%) and the combination of wood burning with SNG 4(10%). Indoor wood burning stove or fireplace in the residence was linked with a higher risk of breast cancer, this risk increases with increase in average frequency used. An elevated risk was observed in the female burning wood and natural gas but no association was found for burning artificial biomass (White *et al.*, 2017). As well as family history of breast cancer is concerned, only one patient had a history of father having breast cancer. In the current study, family history did not play a protective role for the study of breast cancer, since a smaller number of family history cases were considered. Family history a socio-demographical parameter plays a significant role (Collaborative Group, 2001; Elkum *et al.*, 2014) for the occurrence of breast cancer and reported as a risk factor in the previous studies (Braithwaite *et al.*, 2018).

In case of dairy products, 36 (90%) had an intake of milk, yogurt and butter while the rest 4 (10%) had an intake of milk and yogurt. It is said that the incidence rate of breast cancer is influenced by various factors such as exogenous diet, hormone intake and alcohol. Chen *et al.* (2019) deduced that the available epidemiologic evidence and milk models used in the study do not support a strong correlation among breast cancer risk and dairy products, however, there are complex components in diet including milk, cheese consisting of pesticides which are carcinogenic in nature and have potential to cause cancer. In a previous study it was reported that high consumption of non-fermented milk for long time was associated with increase incident of breast cancer, and this incident rate is specific for women with BMI less than 25kg/m² while no significant relationship was observed in between milk consumption and rate of breast cancer to occur (Kaluza *et al.*, 2021), whereas consumption of fermented milk reduces the chance of breast cancer. Moreover, another study contradicted with this study and revealed that milk intake was positively related to risk while the cheese products were negatively relation with the development of breast cancer (Maliou *et al.*, 2018). In another research it was concluded that consumption of non-fermented and fermented milk does not play any significant beneficial or adverse effects in the diet from a perspective of cancer

risk (Nilsson *et al.*, 2020). In the current study, all the patients were eating carbohydrates, lipids, protein and smoked barbecue. Diet of an individual is considered to be one of the major modifiable exposure among environmental risk factors of breast cancer (Lammert *et al.*, 2018). Furthermore, various epidemiological studies have published conflicting results related to the association among breast cancer risk and food in-take (Petimar *et al.*, 2019; Baglietto *et al.*, 2011). Moreover, various studies have traditionally reported the effects of nutrients and foods on cancer risk (Miller *et al.*, 2013; Catsburg *et al.*, 2015). This study also reported that 36 (90%) were not using any kind of cosmetics, 2 (5%) were using occasionally and similar for the frequent users. In a study it is revealed that use of hair color, nail enamel, oxidant, eye shades, mascara, deodorant and cream powder were not associated with the development of breast cancer (Dehdhan *et al.*, 2018). Current research also found that 3 (7.5%) of patients had knowledge about breast cancer, 8 (20%) had very little knowledge and 29 (72.5%) had none. Similar results were also noted by Naqvi *et al.*, (2018) that their knowledge related to breast cancer was dearth among the patients.

This study also reported that 36 (90%) were not using any kind of cosmetics, 2 (5%) were using occasionally and similar for the frequent users. In a study it is revealed that use of hair color, nail enamel, oxidant, eye shades, mascara, deodorant and cream powder were not associated with the development of breast cancer (Dehdhan *et al.*, 2018). Current research also found that 3 (7.5%) of patients had knowledge about breast cancer, 8 (20%) had very little knowledge and 29 (72.5%) had none. Similar results were also noted by Naqvi *et al.*, (2018) that their knowledge related to breast cancer was dearth among the patients.

All the sociodemographic characteristics were analysed by ANOVA test with *P* value 0.05 and the test revealed that all the parameters are statistically significant except duration of marriage *p*= 0.085 as shown in table 1. In table 2 clinical characteristics of the breast cancer patients are shown and it reveals that of the 40 patients, 32 patients (80%) had no other disease except cancer but rest were having different diseases such as asthma, diabetes, hepatitis C, tonsils, appendix and uterus fibres, heart and liver problems.

Frequency of conception followed the same trend as discussed above for the number of children. More than half of the patients (23) were having lump in the right breast and rest 17 (42.5%) were having lump in left breast. 32 (80%) of the patients was not experiencing any kind of secretions from the breast, 4 (10%) had (57.5%) yellow secretions and similar result was observed for white secretions. All the subjects' tumor type was malignant and all of them were experiencing metabolic syndrome and hormonal imbalance because of

having chemotherapy.23 (57.5%) had grade II cancer, 16 (40%) had grade III and only 1 (2.5%) had grade I.

Table 1: Sociodemographic variables of breast cancer patients. Analysis of variance reflects the level of significance.

Sociodemographic Variables		N (%)	P value
Age	25 – 35	9 (22.5)	0.000
	36 – 45	9 (22.5)	
	46 – 55	14 (35)	
	56 – 65	8 (20)	
Weight	<= 41	1 (2.5)	0.000
	42 – 52	7 (17.5)	
	53 – 63	12 (30)	
	64 – 74	14 (35)	
	75 – 85	3 (7.5)	
	86 – 96	3 (7.5)	
Height	4.01 - 4.50	6 (15)	0.000
	4.51 - 5.00	9 (22.5)	
	5.01 - 5.50	23 (57.5)	
	5.51 - 6.00	2 (5)	
BMI	Underweight: less than 18.5	1 (2.5)	0.002
	Normal weight: 18.5 to 24.9	14 (35)	
	Overweight: 25 to 29.9	18 (45)	
	Obese: 30 or more	7 (17.5)	
Locality	Urban	27 (67.5)	0.000
	Rural	13 (32.5)	
Marital Status	Married	39 (97.5)	0.000
	Unmarried	1 (2.5)	
Duration of Marriage (years)	<= 0	1 (2.5)	0.085
	1 – 7	1 (2.5)	
	8 – 14	7 (17.5)	
	15 – 21	5 (12.5)	
	22 – 28	13 (32.5)	
	29 – 35	5 (12.5)	
	36 – 42	5 (12.5)	
	43 – 49	2 (5)	
	50 – 56	1 (2.5)	
Occupation	Housewife	37 (92.5)	0.000
	Educationist	2 (5)	
	Maid	1 (2.5)	
Education	None	20 (50)	0.000
	Primary	8 (20)	
	Matriculation	7 (17.5)	
	Intermediate	3 (7.5)	
	Bachelors	1 (2.5)	
	Masters	1 (2.5)	
No. of Children	0	3 (7.5)	0.000
	1	2 (5)	
	2	3 (7.5)	
	3	6 (15)	
	4	9 (22.5)	
	5	7 (17.5)	
	6	3 (7.5)	
	7	5 (12.5)	
	8	1 (2.5)	
	9	1 (2.5)	
Breast Feeding Behavior	0	3 (7.5)	0.000

and Frequency	1	2 (5)	0.000
	2	3 (7.5)	
	3	6 (15)	
	4	9 (22.5)	
	5	7 (17.5)	
	6	3 (7.5)	
	7	5 (12.5)	
	8	1 (2.5)	
	9	1 (2.5)	
Cooking System	SNGPL	29 (72.5)	0.000
	LPG	2 (5)	
	Wood Burning	5 (12.5)	
	Wood Burning and SNGPL	4 (10)	
Family history of breast cancer	None	39 (97.5)	0.000
	Father	1 (2.5)	
Eating Habits	Carbohydrates, Lipids, Protein and Smoked Barbecue	40 (100)	
Dairy Products	Milk and Yogurt	4 (10)	0.000
	Milk, Yogurt and Butter	36 (90)	
	Less	8 (20)	
	Adequate	3 (7.5)	

Table 2: Clinical characteristics of breast cancer patients. Analysis of variance reflects the level of significance.

Clinical Characteristics		N (%)	P value
Diseases and Abnormalities	None	32 (80)	0.000
	Asthma	1 (2.5)	
	Diabetic	1 (2.5)	
	Heart, Liver and Diabetic	1 (2.5)	
	Heart	1 (2.5)	
	Appendix and Uterus Fibers	1 (2.5)	
	Hepatitis C	1 (2.5)	
	Diabetic and Hepatitis C	1 (2.5)	
	Tonsils	1 (2.5)	
Frequency of Conception	0	3 (7.5)	0.000
	1	2 (5)	
	2	3 (7.5)	
	3	6 (15)	
	4	9 (22.5)	
	5	7 (17.5)	
	6	3 (7.5)	
	7	3 (7.5)	
	8	3 (7.5)	
	9	1 (2.5)	
Position of Lump	Left	17 (42.5)	0.000
	Right	23 (57.5)	
Secretions from Breast	No	32 (80)	0.000
	White	4 (10)	
	Yellow	4 (10)	
Type of Tumor	Malignant	40 (100)	
Metabolic Syndrome / Harmonal Imbalance	Yes	40 (100)	
Grade of Cancer	I	1 (2.5)	0.000

	II	23 (57.5)	
	III	16 (40)	
Treatment	Medicine	1 (2.5)	0.000
	Chemotherapy	39 (97.5)	
Precautionary and Remedial Measures	None	31 (77.5)	0.000
	No Fats	9 (22.5)	

Table 3: Descriptive Statistics (mean, Standard Deviation (SD), Minimum (min), Maximum (max), Significance of Biochemical and hematological parameters of breast cancer patients.

Parameters	Mean $\pm$ SD	Range		Significance	Clinical Range
		Minimum	Maximum		
Hemoglobin	11.48 $\pm$ 1.71	5.60	15.10	0.000	11.5-15 gm/dl
RBC	4.5 $\pm$ 0.69	2.96	6.06	0.000	3.8-4.8X10 ⁶ / μ L
HCT	36.32 $\pm$ 5.47	20.46	47.19	0.000	36-48%
MCV	81.65 $\pm$ 7.65	61.40	94	0.000	76-96fl
MCH	25.88 $\pm$ 3.42	16.70	32.50	0.000	27-32pg
MCHC	31.59 $\pm$ 2.15	26.30	36.40	0.000	30-35X10 ³ / μ L
TLC	7.61 $\pm$ 3.11	4.30	21.21	0.000	4-11X10 ³ / μ L
Platelets	333.43 $\pm$ 113.36	81	632	0.000	150-400%
Lymphocytes	29.99 $\pm$ 9.01	11.70	51.50	0.000	20-40%
Neutrophils	60.03 $\pm$ 10.04	37.10	83.40	0.000	40-75%
Monocytes	7.05 $\pm$ 2.58	2	14.40	0.000	0-6%
Eosinophils	3.39 $\pm$ 3.44	0.20	17.20	0.000	0-4%
Basophils	0.57 $\pm$ 0.35	0.00	1.70	0.000	0-1%
Total Bilirubin	0.43 $\pm$ 0.23	0.10	1.10	0.000	0-1.2mg/dl
Alkaline Phosphates	152.93 $\pm$ 124.05	55	832	0.000	42-98 μ /L
SGPT	36.93 $\pm$ 34.63	8	164	0.005	0-34 μ /L
SGOT	36.50 $\pm$ 24.46	14	128	0.000	0-31 μ /L
Blood Urea	24.23 $\pm$ 7.93	11	52	0.099	13-42mg/dl
Serum Creatinine	0.75 $\pm$ 0.14	0.40	1.10	0.000	0.6-1.1mg/dl
Sodium	138.13 $\pm$ 4.82	128	152	0.000	136-145mmol/L
Potassium	4.20 $\pm$ 0.48	3.10	5.3	0.000	3.5-5.1mmol/L
Chloride	102.60 $\pm$ 3.81	92	110	0.000	98-107mmol/L

Almost all the patients 39 (97.5%) were having chemotherapy for the treatment of breast cancer except the 1(2.5%) was on oral medication. About 31 (77.5%) of the patients were having no precautionary and remedial measures but 9 (22.5%) were avoiding fats in their eating habits. According to anova all the clinical characteristics were statistically significant at *P* value 0.05. Breast cancer is known to be leading cause of death all around the globe but till date very little knowledge regarding the biological markers is there which help to diagnose the disease. Haematological and biological parameters are important parameters used in diagnosis of various diseases, above them one is breast cancer. In table 3, biochemical and haematological parameters were discussed and after statistically analysis it is deduced that all the parameters showed significant results except blood urea (0.099) subjecting to anova with *P* value 0.05. Of the 40 patients included in the study, 42.5% were having less hemoglobin as compared to the clinical range, 55% were within the range and 2.5% were above the range.

Red blood cells (RBC) test was also done and it was noted that 55% were within the clinical range, 15% patients were having less than the range and 30% were having more than clinical range. A total of 55% of the cases had HCT within the permissible limit, while 45% had less than the permissible limit. Only 25% of the patients had MCV less than the permissible limit but 75% were within the limit. In the case of MCH 40% subjects were within range but 57.5% were below range and only 2.5% were above the range.

17.5% patients had MCHC less than the limit while majority of patients (75%) had MCHC with the limit but 7.5% had MCHC greater than 30%. Almost all the individuals (92.5%) had TLC within limit except 7.5% individuals whom level was exceeding the limit. The platelets count of 72.5% effected women was within range but 22.5% range was acceding from the normal and only 5% were below the range. This study results showed that lymphocytes were almost within the limits of 75% subject population but 10% were above the permissible

limit and 15% were below the limits. Neutrophils were also recorded, 90% patients were within the range and 7.5% were greater than the range and 2.5% were less than the range. The majority of the individuals (62.5%) had monocytes above the clinical range furthermore 37.5% were within the clinical range. Most of the patients (77.5%) had eosinophil within the clinical range but 22.5% were above the range.

In case of basophils, almost all the patients (90%) were within the prescribed range but 10% were having basophils more than the prescribed range. In case of total bilirubin all the patients were within the clinical range. Alkaline phosphatase, a biochemical parameter is a potential marker for the early detection of cancer which helps in diagnose of people in developing countries. 65% of the patients had alkaline phosphatase level above the permissible limit and 35% had within the limit. SGPT (ALT) of 72.5% were within the clinical range and 27.5% were above the range. Most of the subjects (62.5%) were within limit, in case of SGOT (AST) but 37.5% were greater than the limit.

The blood urea was found to be within limit in 95% of the patients, 2.5% were above and 2.5% were below the limit. Most of the patients (95%) in case of S/Creatinine were within the limits and 5% were below the limits. Present study revealed that 67.5% had sodium level within limit, 25% had below limit and 7.5% had above the limit. Potassium level in 92.5% patients was within limit, while potassium level in 5% patients was less and in 2.5% was high. Majority of the patients (85%) were having chloride level with in clinical range but 7.5% were having high and 7.5% were having low chloride level. Similar results of haematological and biological Parameters were found in Dejene *et al.*, (2020). Both of these parameters are important for the treatment, as the chemotherapy treatments proceed fluctuation in these parameters occurs which can create more uncertainties. The fluctuations in these parameters are may be due to elevated levels of pro-inflammatory cytokines (Ali *et al.*, 2014).

Conclusion: This study concluded that most of the patients were 48-57 years old and illiterate. It was also found that breast cancer is more dominant in married women. Regarding hematologic profile, the mean hemoglobin, red blood cell count, packed cell volume, mean corpuscular volume; mean corpuscular hemoglobin concentration values were significantly lower among some cases. On the other hand, some hematological parameters like platelet count, neutrophil count, are significantly higher. The incidence rate of breast cancer is 2.5 times higher in Pakistani women than the neighboring countries. An increase in the number of incident cases of cancer has implications for understanding the health-care needs of growing population and the subsequent demands on health-care system.

REFERENCES

- Akinbami A, Popoola A, Adediran A, Dosunmu A, Oshinaike O, Adebola P *et al.*, Full blood count pattern of pre-chemotherapy breast cancer. *Caspian J Intern Med.* 2013;4(1):574-579.
- Ali, L. O. (2014). Study effect of breast cancer on some hematological and biochemical parameters in Babylon Province, Iraq. *IOSR (IOSR-JPBS)*, 9(3), 20-24.
- American Cancer Society, (2011-2012). Breast Cancer facts and figures, Atlanta, 2-4.
- American Cancer Society. (2019). Breast cancer facts & figures 2019-2020. *Am. Cancer Soc*, 1-44.
- Asif, H. M., Sultana, S., Akhtar, N., Rehman, J. U., & Rehman, R. U. (2014). Prevalence, risk factors and disease knowledge of breast cancer in Pakistan. *Asian Pacific journal of cancer prevention*, 15(11), 4411-4416.
- Babiker, S., Nasir, O., Alotaibi, S. H., Marzogi, A., Bogari, M., & Alghamdi, T. (2020). Prospective breast cancer risk factors prediction in Saudi women. *Saudi Journal of Biological Sciences*, 27(6), 1624-1631.
- Baglietto L, Krishnan K, Severi G, Hodge A, Brinkman M, English DR. Dietary patterns and risk of breast cancer. *Br J Cancer.* 2011;104(3):524–31.
- Beral, V., Bull, D., Doll, R., Peto, R., Reeves, G., van den Brandt, P. A., & Goldbohm, R. A. (2004). Collaborative group on hormonal factors in breast cancer: breast cancer and abortion: collaborative reanalysis of data from 53 epidemiological studies, including 83000 women with breast cancer from 16 countries. *Lancet*, 363(9414), 1007-1016.
- Binder-Foucard F, N. Delafosse, A Belot, A. S. Woronoff, L. Remontet (2013) Incidence and mortality of cancer in France during the period 1980–2012: solid tumors. *J, Epidemiol Pub Health.* 62(2): 95–108.
- Bowman, B. T. (2017). Electrolyte disorders associated with cancer. *Journal of Onco-Nephrology*, 1(1), 30-35.
- Braithwaite, D., Miglioretti, D.L., Zhu, W., Demb, J., Trentham-Dietz, A., Sprague, B., Tice, J.A., Onega, T., Henderson, L.M., Buist, D.S., Ziv, E., 2018. Family history and breast cancer risk among older women in the breast cancer surveillance consortium cohort. *JAMA Internal Med.* 178 (4), 494–501.
- Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2018;68(6):394–424.

- cancer epidemic: 10 facts. *Linacre Q* 81: 244-277.
- Catsburg C, Kim RS, Kirsh VA, Soskolne CL, Kreiger N, Rohan TE. Dietary patterns and breast cancer risk: a study in 2 cohorts. *Am J Clin Nutr*. 2015; 101(4):817–23.
- Chauhan, P., Yadav, R., Kaushal, V., & Beniwal, P. (2016). Evaluation of serum biochemical profile of breast cancer patients. *International Journal of Medical Research & Health Sciences*, 5(7), 1-7.
- Chen, L., Li, M., & Li, H. (2019). Milk and yogurt intake and breast cancer risk: A meta-analysis. *Medicine*, 98(12).
- Cmrecak, F., Andrašek, I., Gregov, V., & Beketić-Orešković, L. (2020). Obesity and cancer. *Libri Oncologici: Croatian Journal of Oncology*, 48(2-3), 89-102.
- Collaborative Group on hormonal factors in breast cancer, 2001. Familial breast cancer: collaborative reanalysis of individual data from 52 epidemiological studies including 58,209 women with breast cancer and 101,986 women without the disease. *Lancet*. 27; 358 (9291): 1389-99.
- Das, A. K., Biswas, S. K., Bhattacharya, A., & Alam, E. (2021, March). Introduction to Breast Cancer and Awareness. In *2021 7th International Conference on Advanced Computing and Communication Systems (ICACCS)* (Vol. 1, pp. 227-232). IEEE.
- Dehghan, M., Baniasadi, H., Moghadam, R. F., & Salehi, M. Cosmetic Products Don't Increase The Risk Of Breast Cancer: A Retrospective Case-Control Study In Southeast Iran.
- Elkum, N., Al-Tweigeri, T., Ajarim, D., Al-Zahrani, A., Amer, S.M., Aboussekhra, A., 2014. Obesity is a significant risk factor for breast cancer in Arab women. *BMC Cancer* 14, 788.
- evidence for autosomal dominant transmission in high risk families. *Proc Natl Acad Sci*
- Fei, X., Wu, J., Kong, Z., & Christakos, G. (2015). Urban-rural disparity of breast cancer and socioeconomic risk factors in China. *PLoS One*, 10(2), e0117572.
- Fitzmaurice C, Allen C, Barber RM, Barregard L, Bhutta ZA, Brenner H, *et al*. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 32 cancer groups, 1990 to 2015: a systematic analysis for the global burden of disease study. *JAMA Oncol*. 2017;3(4):524–48.
- Gomez, D., Jimenez-Fonseca, P., Fernández, A. M., Castellanos, P. C., Arbizu, M. V., Cabañes, R. M., ... & Calderon, C. (2021). Impact of obesity on quality of life, psychological distress, and coping on patients with colon cancer. *The Oncologist*, 26(5), e874-e882.
- Goodwin PJ, Chlebowski RT. Obesity and cancer: Insights for clinicians. *J Clin Oncol* 2016;34: 4197–4202
- Grueso Cuesta C, Poquet Jornet JE, Gasent Blesa JM *et al*. Toxicity and effectiveness of car-boplatin in obese or overweight patients. *J Oncol Pharm Pract* 2019; 25:1328–1335
- Hopper, J. L., Dite, G. S., MacInnis, R. J., Liao, Y., Zeinomar, N., Knight, J. A., ... & Terry, M. B. (2018). Age-specific breast cancer risk by body mass index and familial risk: prospective family study cohort (ProF-SC). *Breast Cancer Research*, 20(1), 1-11.
- Ji, P., Gong, Y., Jiang, C. C., Hu, X., Di, G. H., & Shao, Z. M. (2020). Association between socioeconomic factors at diagnosis and survival in breast cancer: A population-based study. *Cancer medicine*, 9(5), 1922-1936.
- Kaluza, J., Komatsu, S., Lauriola, M., Harris, H. R., Bergkvist, L., Michaëlsson, K., & Wolk, A. (2021). Long-term consumption of non-fermented and fermented dairy products and risk of breast cancer by estrogen receptor status—Population-based prospective cohort study. *Clinical Nutrition*, 40(4), 1966-1973.
- Khan, S., Khoso, S. A., Memon, S., Adeel, A., & Nabi, G. (2017). Study of some Hematological parameters as Biomarker for breast Cancer population of Sindh. *Sindh University Research Journal-SURJ (Science Series)*, 49(1).
- Lambe M, Hsieh CC, Chan HW, *et al*. Parity, age at first and last birth, and risk of breast cancer: a population-based study in Sweden. *Breast Cancer Research and Treatment* 1996; 38(3):305–311.
- Lammert J, Grill S, Kiechle M. Modifiable lifestyle factors: opportunities for (hereditary) breast Cancer prevention - a narrative review. *Breast Care (Basel)*, 2018;13(2):109–14.
- Lega IC, Lipscombe LL. Review: Diabetes, obesity, and cancer—Pathophysiology and clinical implications. *Endocr Rev* 2020;41:33–52.
- Lipworth, L., Bailey, L. R., & Trichopoulos, D. (2000). History of breast-feeding in relation to breast cancer risk: a review of the epidemiologic literature. *Journal of the National Cancer Institute*, 92(4), 302-312.
- Ma H, Bernstein L, Pike MC, Ursin G. Reproductive factors and breast cancer risk according to joint estrogen and progesterone receptor status: a meta-analysis of epidemiological studies. *Breast Cancer Research* 2006; 8(4):R43.
- Maliou, D., Belmadi, D., Saadi, W., Mahfouf, H., Benzidane, N., & Bitam, A. (2018). Effect of

- dairy products intake on breast cancer risk: A case-control study in Algeria. *Nutrition Clinique et Métabolisme*, 32(3), 187-194.
- Miller PE, Cross AJ, Subar AF, Krebs-Smith SM, Park Y, Powell-Wiley T. Comparison of 4 established DASH diet indexes: examining associations of index scores and colorectal cancer. *Am J Clin Nutr*. 2013;98(3):794–803.
- Naqvi, A. A., Zehra, F., Ahmad, R., Ahmad, N., Yazdani, N., Usmani, S., & Khan, S. J. (2018). Awareness, knowledge and attitude towards breast cancer, breast screening and early detection techniques among women in Pakistan. *JPMA. The Journal of the Pakistan Medical Association*, 68(4), 576-586.
- Newman B1, Austin MA, Lee M, King MC (1988). Inheritance of human breast cancer:
- Nilsson, L. M., Winkvist, A., Esberg, A., Jansson, J. H., Wennberg, P., Van Guelpen, B., & Johansson, I. (2020). Dairy products and cancer risk in a Northern Sweden population. *Nutrition and cancer*, 72(3), 409-420.
- Osaro, E., Chinoye, M. E., Michael, R., & Tosan, E. (2018). Hypovitaminosis C Among Women of African Descent with Breast Cancer in Sokoto, North-Western Nigeria: Case for Ascorbic Acid Supplementation. *International Journal of Clinical Medicine Research*, 5(1), 1-6.
- Peate, I. (2018). Understanding cancer. *British Journal of Healthcare Assistants*, 12(7), 350-355.
- Petimar J, Park YM, Smith-Warner SA, Fung TT, Sandler DP. Dietary index scores and invasive breast cancer risk among women with a family history of breast cancer. *Am J Clin Nutr*. 2019;109(5):1393–401.
- Renehan AG, Zwahlen M, Egger M. Adiposity and cancer risk: New mechanistic insights from epidemiology. *Nat Rev Cancer* 2015; 15:484–498.
- Rosner, M. H., & Dalkin, A. C. (2014). Electrolyte disorders associated with cancer. *Advances in chronic kidney disease*, 21(1), 7-17.
- Schneider AP 2nd, Zainer CM, Kubat CK, Mullen NK, Windisch AK (2014) The breast
- Sohail S, Alam SN. Breast cancer in Pakistan - awareness and early detection. *J Coll Physicians Surg Pak*. 2007;17(12):711–2.
- Tietz textbook of fundamental of clinical chemistry, 6th edition Burtis CA, Ashwood ER, Bruns DE, Barbara GS .2008 by sanders, imprint of Elsevier Ins ISBN:978-0-7216-3865-2.
- U S A 85: 3044–3048.
- Van den Brandt, D. Spiegelman, (2000) Pooled analysis of prospective cohort studies on height, weight, and breast cancer risk. *Am. J. Epidemiol*; 152 (6): 514-527.
- White, A. J., & Sandler, D. P. (2017). Indoor wood-burning stove and fireplace use and breast cancer in a prospective cohort study. *Environmental health perspectives*, 125(7), 077011.
- Wolk A, Gridley G, Svensson M *et al*. A pro-spective study of obesity and cancer risk (Sweden). *Cancer Causes Control* 2001; 12:13–21
- Zaheer, S., Shah, N., Maqbool, S. A., & Soomro, N. M. (2019). Estimates of past and future time trends in age-specific breast cancer incidence among women in Karachi, Pakistan: 2004–2025. *BMC public health*, 19(1), 1-9.
- Zahnd, W. E., James, A. S., Jenkins, W. D., Izadi, S. R., Fogleman, A. J., Steward, D. E., ... & Brard, L. (2018). Rural–urban differences in cancer incidence and trends in the United States. 1265-1274.
- Zhang X, Wu WKK, Yu J. Obesity and cancer. In: Ahmad S, Imam SK, eds., *Obesity*. Springer; 2016: 211–220.