

KIBOGORA POLYTECHNIC

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCES

**Topic: EVALUATION OF LIVER AND RENAL FUNCTION AMONG BREAST
CANCER PATIENT UNDER CHEMOTHERAPY AT CHUB HOSPITAL**

Case study: at chub hospital, huye district, ngoma sector

period :2018-2019

Undergraduate thesis presented in fulfillment of the requirements for the Bachelor's degree
with honor in biomedical laboratory sciences

PREPARED BY:

BOLINGO Pascaline REG. N°1600137

MUJAWAYEZU Donatha REG.N° 1600178

SUPERVISOR:

RURABIYAKA Joseph (Assistant Lecturer)

Kibogora, August, 2019

DECLARATION

Declaration by the Candidates

We, do hereby declare that this is our own original work and not a duplication of any similar academic work. It has therefore not been submitted to any other institution of higher learning.

All materials in this paper which are not our own have been duly acknowledged.

Signature:.....

Signature:.....

DATE:.....

Declaration by the Supervisor:

I declare that this work has been submitted for examination with my approval as KP Supervisor

SUPERVISOR, RURABIYAKA Joseph

Signature:.....

Date:

ABSTRACT

Breast cancer is one of the most common types of cancer in women and is second leading cause of cancer-related deaths in women worldwide after cervical cancer. Initially breast cancer cases were commonly seen in huge number in developed countries however the number of breast cancer in developing countries, in sub-Saharan region including Rwanda is expanding every year, therefore the objective of our study was about evaluation of liver and renal function among breast cancer patients under chemotherapy attending CHUB hospital.

During our project a total number of 120 breast cancer patients under chemotherapy were studied for liver and renal function. Among 120 breast cancer patients studied 24 patients corresponding to 20.5% have high value for AST while 96 showed normal values, 15 patients correspond to 12.5% have high value for ALT while 105 patients demonstrated normal values. Based on the findings of our study among 120 cancer patients studied 15 patients equals to 12.5% have developed liver disorder and our results are different to other findings of the research done earlier where the prevalence of liver disorder among the breast cancer patients taking drugs was 40% in the research conducted by Nazario, H. E., Lepe, R., & Trotter, J. F, 2011. Our study showed that out 120 cancer patients only 3 people correspond 2.5% had low values for blood urea nitrogen and 59 cancer patients corresponding to 48.8% are above normal value and 58 patients showed normal values. While 15 people correspond 12.7% have low values for creatinine and 4 people correspond 3.0% have high value and 101 demonstrate normal values. And our results are different to other findings of the research done earlier where the prevalence renal disorder among the breast cancer patients taking drugs was 40% - 50% in the research conducted by Darmon, M., Ciroidi, M., Thiery, G., Schlemmer, B., & Azoulay, E, 2006).

As other studies said that approximately 40–50% of women with metastatic breast cancer will have liver metastasis at some point during the course of their disease (Nazario, H. E., Lepe, R., & Trotter, J. F, 2011) and acute renal failure (ARF) in breast cancer patients is a dreadful complication that causes substantial morbidity and mortality (Darmon, M., Ciroidi, M., Thiery, G., Schlemmer, B., & Azoulay, E, 2006), our study did go beyond them because we found that on liver 87.5% do not have liver disease whereas 12.5% have and about renal 84.3% do not present renal disease while 15.7% did.

Based on those, we conclude that patients with breast cancer and who are on treatment have high risk of developing liver and renal disease.

DEDICATION

To all our daily life partners, we mean far and closest friends in general.

Once again to all our follow students.

We are also still cherishing our parents for keeping sharp eyes on us.

To his almighty God for his extraordinary help hand.

ACKNOWLEDGEMENTS

Our special thanks are addressed to almighty God, for his guidance and help. Special appreciation goes to our Supervisor RURABIYAKA Joseph for his incomparable advice and tirelessness effort for guidance during the developments of this work. The profound gratitude is also expressed to the administration of KIBOGORA Polytechnic and in particular the biomedical laboratory sciences department for all knowledge in several subjects obtained during three years. We would like also to thank all staff and lecturers of biomedical laboratory science department for their advices and supports which are balanced reasonable and parental. We also recognize a huge support and guidance from the Kibogora Polytechnic library staff without their effort we couldn't get to this wonderful achievement. Heartfelt gratitude goes to all our friends who in one way or another assisted us during the study.

Thanks to all. We wish all the best!

DEFINITION AND ACRONYMS

%: percentage

5-F U: 5-fluoracil

ALT: Alanine AminoTransferase

ARF: Acute renal failure

ARLI: Acute related liver injury

AST: Aspartate Amino Transferase

BC: Breast cancer

BCP: Blood chemistry panel

BUN: Blood urea nitrogen

DNA: Deoxyribonucleic acid

ER: Expression estrogen receptor

GFR: Glomerular filtration rate

H E R2: Human epidermal growth factor receptor2

K F T: Kidney function tests

PR: Progesterone receptor

RNA: Ribonucleic acid

SGOT: Serum glutamate oxalo acetic transaminase

SGPT: Serum glutamate pyruvate transaminase

SPSS: Statistical package for social sciences

TABLE OF CONTENTS

| | |
|---|----|
| DECLARATION..... | ii |
| DEDICATION | iv |
| DEFINITION AND ACRONYMS | vi |
| CHAPTER ONE: 1.0. GENERAL INTRODUCTION..... | 1 |
| 1.1. BACK GROUND OF STUDY | 1 |
| 1.2. PROBLEM STATEMENT..... | 3 |
| 1.3. PURPOSE OF STUDY | 4 |
| 1.4. Research question | 4 |
| 1.5. Objective of study | 5 |
| 1.6. SIGNIFICANCE OF STUDY | 5 |
| 1.8. Scope of study..... | 5 |
| 1.8.1. Personal scope | 5 |
| 1.8.2. Social scope..... | 5 |
| 1.8.3. Academic scope..... | 6 |
| CHAPTER TWO LITERATURE RIVIEW | 6 |
| 2.0. INTRODUCTION..... | 7 |
| 2.1. Definition of key concept | 7 |
| 2.2. LIVER FUNCTION TEST..... | 7 |
| 2.2.1. LIVER ENZYMES (AMINO-TRANSFERASES)..... | 8 |
| 2.2.3. LIVER DISFUNCTION WITH BREAST CANCER | 8 |
| 2.3. RENAL FUNCTION TESTS | 9 |
| 2.3.1. CREATININE VALUE | 9 |
| 2.3.2. BLOOD UREA NITROGEN (BUN) | 9 |
| 2.3.3. Renal failure with breast cancer | 10 |
| 2.4. Breast cancer..... | 10 |

| | |
|--|-----------|
| 2.4.1. Risk factors..... | 10 |
| 2. CHEMOTHERAPY | 10 |
| 2.5.1. Definition | 10 |
| 2.5.2. Classification of Chemotherapeutic Agents..... | 11 |
| CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY..... | 12 |
| 3.0. Introduction..... | 12 |
| 3.1. Research approach and design. | 12 |
| 3.2. Target population..... | 12 |
| 3.3. Sampling procedures..... | 12 |
| 3.4. Sample size..... | 12 |
| 3.5. Research instruments for data collection | 13 |
| 3.6. Data collection procedures. | 13 |
| 3.8. Data analysis | 13 |
| 3.9. Reliability and validity measures. | 14 |
| CHAPTER FOUR: DATA PRESENTATION, ANALYSIS, INTERPRETATION AND SUMMARY | 15 |
| 4.0. INTRODUCTION..... | 15 |
| 4. 1. DATA PRESENTATION AND ANALYSIS | 15 |
| 4.2. DISCUSSIONS OF FINDINGS | 16 |
| CHAPTER FIVE: GENERAL CONCLUSION AND RECOMMENDATIONS..... | 18 |
| 5.0. INTRODUCTION..... | 18 |
| 5.1. CONCLUSION..... | 18 |
| 5.2. RECOMMENDATIONS | 18 |
| 5.3. SUGGESTION FOR FURTHER STUDY..... | 18 |
| REFERENCES..... | 19 |
| APPENDICES..... | 21 |

CHAPTER ONE: 1.0.GENERAL INTRODUCTION

This chapter deals with back ground, problem statement, objectives of study, hypothesis of study, choose of study, interest of study, significance of study.

1.1. BACK GROUND OF STUDY

Breast cancer is one of the most common types of cancer in women and is second leading cause of cancer-related deaths in women worldwide after cervical cancer(GaniyopeyemiAbdulrahman1and GaniyuAdebisiRahman2, 2014)

In 2008, approximately1.4 million women were diagnosed with breast cancer world with corresponding 460,000 deaths. Of these, approximately 450,000 women were diagnosed with the disease in Europe with a corresponding 140,000 deaths, while 68,000 women were reportedly diagnosed with the disease in Africa with a corresponding 37000 deaths.(De Rossi T, Panis C, Victorino VJ, Freitas de Freitas L, 2009).

Incidence rates vary greatly worldwide from 19.3 per 100,000 women in Eastern Africa to 89.7 per 100,000 women in Western Europe .In most of the developing regions the incidence rates are below 40 per 100,000. The incidence rate of breast cancer is much lower in Asian countries as compare to western countries (Aebi, S., Davidson, T., Gruber, G., Cardoso, F., & ESMO Guidelines Working Group, 2011, Breast cancer incidence is increasing in all regions of the world with majority of rise seen in developing countries (Chauhan P.1, Yadav R.*1, Kaushal V.2 and Beniwal P.1, 2016).

Breast cancer (BC) is the most common malignancy among women throughout the industrialized world, where the incidence rate of breast cancer has increased steadily over the past 40 years (L. Inaotombi Devi, Lalsanglura Ralte and M. Ayub Ali, 2015).

Even though it is generally increasing, the lowest incidence rates are found in most African countries. Thisis because data for developing countries are limited and also researchers believed that this is because socio-economic and lifestyle changes (for example, later childbearing and dietary changes) and associated changes in menstrual patterns and increases in life expectancy will cause the burden of breast cancer(Kadam Charushila Y* and Abhang Subodhini A, 2015). Breast cancers are defined according to the expression of estrogen

receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2).

Gene-expression profiling has further defined the molecular subtypes of breast cancers according to their gene-expression profile. Molecular profiling identified five main categories of breast cancer subtypes. They are described as luminal A, luminal B, HER2/new/ERBB2 positive, basal and normal breast like (Gupta, N., Goswami, B., & Mittal, P., 2012).

Luminal A and luminal B are commonly ER positive, and possess expression patterns typical for luminal type cells. Patients with luminal tumors generally have better prognosis (Ali, D., Kibria, D., Islam, D., Uddin, D. and Chowdhury, D., 2002).

Patients undergoing cytotoxic chemotherapy requires careful assessment of liver function both prior to treatment and during therapy. Potentiation of pre-existing liver disease, especially viral hepatitis. Altered hepatic drug metabolism due to underlying liver disease can result in higher or more persistent drug levels, thereby causing increased systemic toxicity (particular lymyelo-suppression) or worsening of liver function because of chemotherapy-induced hepatotoxicity.

The inter relationship between the liver and chemotherapy is reviewed here. General aspects of drug metabolism and patterns of hepatic injury are discussed separately, as is reactivation of hepatitis B (HBV) viral infection in patients treated with immunosuppressive therapy, and hepatotoxicity associated with check point inhibitor immunotherapy make sure it is spelled very well.

Complete blood count and especially the biochemistry work up analysis are pre-requisite investigation for breast cancer patients before the use of any treatment the cancer treatments like chemotherapy and radiation therapy generally destroy the cancerous cells in the body. However, some of the normal cells are also sensitive to these treatments and get damaged in the process. Chemotherapy has been recognized to be efficacious in cancer treatment and its use has been increasing over the past several decades. Although they benefit patients overall, chemotherapeutic drugs can damage healthy cells along with cancerous cells, causing side effects. Some common side effects associated with chemotherapy generally resolve when the treatment ends. However, organ damage and functional disabilities caused by the disease, the

treatment, or both may occur months or years after the treatment is completed (Morimoto L, Coalson J, Mowat F, O'Malley C., 2010).

Complete blood counts are routinely performed during chemotherapy and other breast cancer treatments to check the number of each type of blood cell circulating in the body. Not The complete blood count also helps to check for different side effects of chemotherapy not only the blood cells change which possibly may occur but also changes may take place during the body metabolism reason why chemistry panels should be performed before and during the breast cancer treatment and this will help to monitor the patient's general health status in order to counteract any abnormal body metabolism which may occur due chemotherapy treatment of breast cancer (Chauhan P.1, Yadav R.*1, Kaushal V.2 and Beniwal P.1, 2016).

Blood chemistry panel (BCP) is a common tests used to evaluate a variety of chemical components released from body tissues or produced during the breakdown or metabolism of certain substances. 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 (Chauhan P.1, Yadav R.*1, Kaushal V.2 and Beniwal P.1, 2016).

1.2. PROBLEM STATEMENT

Breast cancer is the most common cancer in women worldwide. In 2008, 1.38 million new cases and 458,000 Breast cancer deaths were noted in the world (Cardoso, F., Senkus-Konefka, E., Fallowfield, L., Costa, A., Castiglione, M., & ESMO Guidelines Working Group, 2010).

In 2006, the crude incidence of breast cancer in the European Union was 109.8/100 000, and the mortality was 38.4/100,000 women/year. Since 1990 the incidence rate has increased 1.5% annually (Ahmed, S. A., Hamed, M. A., & Omar, O. S., 2015).

Breast cancer as the most common female malignancy in Africa, Being the cancer with the second highest incidence and/or Mortality where 68000 women were reportedly diagnosed with the disease with a corresponding 37,000 deaths. Although breast cancer incidence rates

are lower in Africa than in the rest of the world (Amanda Eng^{1,2}, Valerie McCormack³, 2014).

In Rwanda today the number of patients affected by breast cancer is increasing about 40% and also liver and renal failure are very expensive for treatment especially when renal failure has developed as the renal dialysis or kidney transplantation have a huge cost, so people lose a lot of money at the hospital for medication of complications produced by the treatment of the disease mentioned above (Darmon et al).

This research also will contribute in education of breast cancer patients about management of breast cancer disease focusing on keeping blood enzymes levels as close to normal level by providing a healthy diet and use appropriate medications for breast cancer patients and therefore avoid complication such as liver and renal damage.

after the opening of Rwanda's first public cancer facility and first multidisciplinary breast clinic, a large number of patients presented with breast concerns, and 55% of those with breast masses were ultimately diagnosed with cancer. as more and more providers are trained in cancer care, and as community awareness of breast disease and breast cancer increases. In turn, this monitoring will enable appropriate allocation of resources for capacity-building, diagnosis, and treatment to ensure that accessible and affordable services are available to meet patient demand (Sievers A, et al).

1.3. PURPOSE OF STUDY

Effect of chemotherapy on liver enzymes ALAT and ASAT and renal function (creatinine and urea) among breast cancer patients.

1.4. Research question

- What is the level of effect of chemotherapy to liver and renal function among breast cancer patients treated at CHUB hospital?
- Is there any correlation between liver and renal dysfunction with patient under chemotherapy of breast cancer staging?
- How chemotherapy of breast cancer can damage the liver and renal function.

1.5. Objective of study

General objective:

- To evaluate liver and renal function among breast cancer patient under chemotherapy attending CHUB hospital.

1.5.1. Specific Objectives

1. Assess the effect of chemotherapy on liver function among breast cancer patients during the course of treatment.

1.6. SIGNIFICANCE OF STUDY

There are studies done in different area on breast cancer but none of these researches were done about both liver and renal function in breast cancer patients during chemotherapy. The aim of this study will help us to evaluate the status of liver and renal activity of breast cancer patients so that it will generate some useful information for clinicians and patients during the management of subsequent treatment.

Early identification of liver and renal dysfunction will be very important particularly for the management of breast cancer patients and may contribute in the reduction of various complications which develop within these organs stated above.

1.8. Scope of study

1.8.1. Personal scope

This study will help the research to gain the experience in data analysis based on the data will be obtained from breast cancer patients from CHUB hospital who will be under chemotherapy in the terms of their renal and liver evolution.

1.8.2. Social scope

This study will facilitate laboratories and service of oncology clinic department to know the problem and to do more investigation on the patients in the course of chemotherapy and take care of how the tumor cells could be located.

1.8.3. Academic scope

This research will help to obtain data on liver and renal function among breast cancer patients under chemotherapy at CHUB hospital and findings will be discussed and shared among scientists and physicians.

Delimitation of the study

This study will be delimited in domain, time and space

In domain, this work will focus on biochemistry and hematology domain

CHAPTER TWO LITERATURE REVIEW

2.0. INTRODUCTION

This chapter deals with the definition of key concepts: breast cancer and chemotherapy (including classification of chemotherapy), Liver function test (ALT, ASAT), renal function test (Blood Urea Nitrogen).

2.1. Definition of key concept

Cancer: is abnormal proliferation of the cells.

Chemotherapy: is the treatment of cancer using anti-cancer medication to kill cancer cells

Prevalence: is statistical concept referring to the number of cases of disease that are present in population at given time.

Specificity: its referto the ability of the test to correctlyidentifythose patients without the disease.

Sensitivity:its refers to the ability of test to correctlyidentifythose patients with the disease.

Toxicity: Degree to which a toxic substance may harm a cell or organism.

Toxicity of grade 1: level of toxicity which is considered as a weak in which its value is 1.256-2.5x normal value of ALT and ASAT in serum.

Toxicity of grade 2: the level of toxicity which is considered as moderate in which its value is 2.6-5x normal value of ALT and ASAT in serum.

Toxicity of grade 3: the level of toxicity which is considered as severe in which its value is 5.1 -10x normal value of ALT and ASAT in serum.

Toxicity of grade 4: the level of toxicity which is considered as severe in which its value is >10x normal value of ALT and ASAT in serum.

Transaminitis: abnormal elevation of transaminases.

2.2. LIVER FUNCTION TEST

Liver Function Tests (LFTs) are one of the most commonly requested screening blood tests. Whether for the investigation of suspected liver disease, monitoring of disease activity, or simply as 'routine' blood analysis, these tests can provide a host of information on a range of disease processes (Philip Hall, Johnny Cash, 2012)

2.2.1. LIVER ENZYMES (AMINO-TRANSFERASES)

The aminotransferases (formerly transaminases) are the most frequently utilized and specific indicators of hepatocellular necrosis. These enzymes- aspartate aminotransferase (AST, formerly serum glutamate oxaloacetic transaminase-SGOT) and alanine amino transferase (ALT, formerly serum glutamic pyruvate transaminase-SGPT) catalyze the transfer of the α amino acids of aspartate and alanine respectively to the α keto group of ketoglutaric acid.

ALT is primarily localized to the liver but the AST is present in a wide variety of tissues like the heart, skeletal muscle, kidney, brain and liver. AST: alanine + a ketoglutarate = oxaloacetate +glutamate ALT: alanine + a ketoglutarate = pyruvate + glutamate⁵

Whereas the AST is present in both the mitochondria and cytosol of hepatocytes, ALT is localized to the cytosol. The cytosolic and mitochondrial forms of AST are true is enzymes and immunologically distinct (B.R. Thapa and Anuj Walia, 2007)

2.2.3. LIVER DISFUNCTION WITH BREAST CANCER

Hepatic dysfunction in patients with breast cancer can occur as a result of pre-existing disease processes (such as Gilbert's disease drug-induced cirrhosis) or from metastatic invasion. Most studies do not distinguish between liver dysfunction caused by cancer and liver dysfunction from other causes (Superfin, D., Iannucci, A. A., & Davies, A. M, 2007).

Breast cancer usually spreads to the bones, lungs, and/or liver.

Approximately 40–50% of women with metastatic breast cancer will have liver metastasis at some point during the course of their disease. Hepatic metastasis can present at the time of diagnosis; however, particularly for patients diagnosed with invasive breast cancer, the metastatic process can occur several years later, then after treatment (Nazario, H. E., Lepe, R., & Trotter, J. F, 2011).

When tissue damage occurs, cellular enzymes may be released into the serum and elevation of certain enzymes is often associated with damage to specific tissue or organ. Although the enzymes mentioned are present in the tissue throughout the body, their elevation (particularly in combination) is most often associated with liver injury or disease. Elevation of aminotransferase AST (formerly named SGOT) and ALT (formerly named SGPT) often reflects hepatocellular damage. Hepatic disease associated with breast cancer is common and

can result from metastatic spread of the tumor to the liver, or can be caused by systemic treatment with chemotherapeutic or anti-endocrine agents. Metastatic disease to the liver can present clinically and pathologically in various ways (Dr Jennifer R Diamond, MDa, , , Christina A Finlayson, MDb, Virginia F Borge, 2009).

2.3. RENAL FUNCTION TESTS

The kidney has the ability to perform many complex and diverse functions, such as filtration, reabsorption and secretion of solutes, and production of concentrated urine, to fulfill the purpose of maintaining homeostasis. It is important that normal renal physiology and biochemistry be understood by the pathologist and toxicologist to recognize functional morphologic alterations that may occur due to disease (Darmon, M., Cioldi, M., Thiery, G., Schlemmer, B., & Azoulay, E, 2006).

2.3.1. CREATININE VALUE

Creatinine is the end-product of skeletal muscle catabolism. Creatinine is disposed almost entirely by glomerular filtration. Normal ranges of serum creatinine are 0.5 to 1.5 mg/dl. Creatinine production is proportional to skeletal muscle mass, so elderly patients may have normal values despite reduction in GFR. Also patients may still have impaired renal function even though the values are within normal. For example if a patients baseline creatinine is 0.6 mg/dl then it jumps to 1.2 mg/dl an approximate 50% decrease in GFR has occurred despite the values being within normal. More accurate assessment of renal function is obtained from creatinine clearance (Rosen, M. H., & Bolton, W. K, 2006).

2.3.2. BLOOD UREA NITROGEN (BUN)

Urea is an end product of protein metabolism and it's a product reflects diet protein intake and protein catabolic rate. Urea is excreted by GFR; it's reabsorbed along the tubules, especially in sodium-avid extracellular volume contraction. Normal BUN to creatinine concentration ratio in serum is 10:1. The ratio can be increased in volume depletion (dehydration), catabolic states such as infection, corticosteroid use (catabolic drug), increase protein intake (diet), GI hemorrhage, degradation of blood from hematoma, and obstructive uropathy. Normal BUN values are 8-20 mg/dl. Disadvantage of BUN/Creatinine is that they are insensitive measurement of renal function. Changes are usually not evident till there is a 50-75% decrease in GFR (Rosen, M. H., & Bolton, W. K, 2006).

2.3.3. Renal failure with breast cancer

Acute renal failure (ARF) in breast cancer patients is a dreadful complication that causes substantial morbidity and mortality. Moreover, ARF may preclude optimal cancer treatment by requiring a decrease in chemotherapy dosage or by contra-indicating potentially curative treatment. The pathways leading to ARF in cancer patients are common to the development of ARF in other conditions. However, ARF may also develop due to etiologies arising from cancer treatment, such as nephrotoxic chemotherapy agents or the disease itself (Darmon, M., Ciroldi, M., Thiery, G., Schlemmer, B., & Azoulay, E, 2006).

2.4. Breast cancer

Breast cancer is a kind of cancer that develops from breast cells. Breast cancer usually starts off in the inner lining of milk ducts or the lobules that supply them with milk. A malignant tumor can spread to other parts of the body. Someone with breast cancer may have cancer cells in just one part of the breast, which might be felt as a lump. The cancer can spread throughout one or both breasts. Sometimes breast cancer spreads to other parts of the body, like the bones, the liver, or elsewhere (Agarwal, G., Pradeep, P., Aggarwal, V., Yip, C. and Cheung, P., 2007). Tumors in the breast can be benign (not cancer) or malignant (cancer):

2.4.1. Risk factors

Is any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury. Some are Menopause, oral contraceptive use, cigarette smoking, and family history of breast cancer (Gajalakshmi CK, Shanta V:, 1991)

2. CHEMOTHERAPY

2.5.1. Definition

Chemotherapy is a type of cancer treatment that uses a single drug or combinations of drugs to slow or stop the rapid growth of cancer cells by impacting cell division. Depending on the type and stage of the cancer, chemotherapy can be used prior to surgery to shrink a tumor enough to make surgical removal possible (neoadjuvant therapy) or after surgery, alone or coupled with radiation therapies, to destroy any undetected cancer cells that may have migrated to other parts of the body (adjuvant therapy). Sometimes, chemotherapy is

administered to manage the pain or pressure caused by cancer (palliative care) (Du, X. L., Xia, R., & Hardy, D, 2010).

2.5.2. Classification of Chemotherapeutic Agents

Chemotherapeutic agents can be classified into the following groups based on their mechanisms:

- 1) Alkylating agents directly damage DNA to prevent the cancer cell from reproducing. These agents attach an alkyl group, resulting in linking nucleobases in the DNA double helix, which prevents DNA replication and cell division. These agents work in all phases of the cell cycle. Examples include cisplatin, carboplatin, cyclophosphamide (Cytoxan®), and ifosfamide. Of these alkylating agents, cyclophosphamide, coupled with two other agents, is commonly used in breast cancer treatment in the adjuvant setting (Mehta RL, Chertow GM., 2003).
- 2) Anti-metabolites interfere with DNA and RNA growth by substituting for the normal building blocks of RNA and DNA. These agents damage cells during the S phase. Examples used in breast cancer treatment include 5-fluorouracil (5-FU) and methotrexate.
- 3) Anti-tumor antibiotics interfere with enzymes involved in DNA replication. These agents work in all phases of the cell cycle and are widely used for a variety of cancers. Examples used in breast cancer treatment include doxorubicin (Adriamycin and epirubicin).
- 4) Plant alkaloids are plant-derived chemicals that can stop or inhibit enzymes from making proteins needed for cell reproduction. These drugs work during the M phase of the cell cycle, but can damage cells in all phases. Thus, they are used to treat many different types of cancer including breast, lung, myelomas, lymphomas, and leukemia. Examples used in breast cancer treatment include the taxanes (paclitaxel and docetaxel) (Mehta RL, Chertow GM., 2003).

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY.

3.0. Introduction

This chapter Clearlydescribes the research approach especially qualitative and quantitative approaches and the description of research design, target population, sampling procedures, sample size, research instruments for data collection, data collection procedures, ethical issues, data analysis methods and reliability and validity measures that will be used in the evaluation of liver and renal function among breast cancer patient under chemotherapy, period 2018-2019.

3.1. Research approach and design.

A research approach and design that we used to find the data, are the CHUB books which keeps the data and in our research we analyse those data which are recorded.

3.2. Target population.

The target population are patients under chemotherapy of breast cancer diagnosed in CHUB Hospital from 2018 up to 2019

3.3. Sampling procedures.

According to ALBALLERO, (1999) sampling involves taking a number of elements in the set of elements to be observed or treated. The research will rely on primary and secondary data in order to come up with accurate and objective findings. The procedure that the research will be used must be based on the breast cancer patients of CHUB hospital in order to collect primary data.

3.4. Sample size

A sample is simply a subset of the entire population. The concept of sample arises from the inability of the researchers to test all the individuals in a given population. The sample must be the representative of the population from which it was drawn and it must have good size to warrant statistical analysis. The main function of the sample is to allow the researchers to conduct to individuals from the population so that the results of their study can be used to

derive conclusions that were applying to the entire population. In this research we have sample size of 120 patients .

3.5. Research instruments for data collection

The study will be carried out by using books of CHUB to make analysis of result recorded by CHUB Hospital.

3.5.1. Observation

Observation will be used to check the impacts of the breast cancer under chemotherapy to the patients and to the community that everyday help those patients.

3.6. Data collection procedures.

In our study we have 120 breast cancer patients under chemotherapy and we analysed their chemical parameters for evaluating their liver and renal function (ASAT,ALAT UREE CREATININE).

3.7. Ethical issues.

The process of this research will considering the ethical issues regarding to the research problem identification, to the spreading widely of findings. There searcher will take into account all ethical issues related to anonymity, privacy, vulnerable group and Confidentiality that will be very helpful to the researcher to obtain all information concerning to the study without harming any patient.

3.8. Data analysis

The data that will be gathered, will be analyzed using descriptive statistics, especially frequency, percentage, and mean. Descriptive statistics will help the researcher to make inferences about characteristics of entire population, and will help the researcher to summarize responses from the target population of breast cancer at CHUB hospital.

inclusion criteria :female patients, breast cancer patients which are on chemotherapy .

exclusion criteria : male patients ,breast cancer patients which are not on chemotherapy.

3.9. Reliability and validity measures.

The data collected and analyzed will be helpful to the researchers by giving the ability to measure the something consistently means that by repeated measurements would give the same result. Also give a quality of measurement indicating the confidential interval based on the selected sample the results are the same to the entire population.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS, INTERPRETATION AND SUMMARY

4.0. INTRODUCTION

This chapter includes data analysis and presentation of findings. It starts with presentation of characteristics of study subjects, and then each objective and question is being addressed by the analysis and discussion

4. 1. DATA PRESENTATION AND ANALYSIS

Table 1:prevalence of normal and abnormal blood Urea nitrogen in patients studied

| Below | normal | High | Total |
|-------|--------|------|-------|
| 2.5 | 48.7 | 48.8 | 100 |

Table 2: prevalence of normal and abnormal creatinine patient studied

| Below | normal | High | Total |
|-------|--------|------|-------|
| 12.7 | 84.3 | 3 | 100 |

The tables above shows that out of 120 patients studied 3 patients presenting 2.5% shows low values of urea,58 patients represent 48.3% shows high value and 59 patients represents 48.8% shows normal values . While 15 patients represents 12.7% shows low values for creatinine, 101 patients represent 84.1% shows normal and 4 patients represent 3% shows high values.

Normal values : uree :5-22mg/gl

creatinine :0.5-1.1mg/dl

Table 3: prevalence of AST in the overall population studied

| Normal | High | Total |
|--------|------|-------|
| 79.5 | 20.5 | 100 |

Table 4: prevalence of ALT in the overall population studied

| Normal | High | Total |
|--------|------|-------|
| 87.5 | 12.5 | 100 |

The tables above shows that out of 120 patients studied 24 patients presenting 20.5% shows high values of AST and 96 patients represents 79.5% shows normal values. While 15 patients represents 12.7% shows high values for ALT, 105 patients represent shows 87.5% normal.

Normal values: ASAT: 0-35 IU/L

ALAT: 0-45 IU/L

4.2. DISCUSSIONS OF FINDINGS

The objective of our study was to assess the effect of chemotherapy on liver and renal function level among breast cancer patients during the course of treatment from 2018 and up to July 2019

Among 120 breast cancer patients studied 24 patients corresponding to 20.5% have high value for AST while 96 showed normal values, 15 patients correspond to 12.5% have high value for ALT while 105 patients demonstrated normal values. Based on the findings of our study among 120 cancer patients studied 15 patients equals to 12.5% have developed liver disorder and our results are different to other findings of the research done earlier where the prevalence of liver disorder among the breast cancer patients taking drugs was 40% in the research conducted by (Nazario and his colleagues) in Rwanda.

Our study showed that out 120 cancer patients only 3 people correspond 2.5% had low values for blood urea nitrogen and 59 cancer patients corresponding to 48.8% are above normal value and 58 patients showed normal values. While 15 people correspond 12.7% have low values for creatinine and 4 people correspond 3.0% have high value and 101 demonstrate normal values. And our results are different to other findings of the research done earlier where the prevalence renal disorder among the breast cancer patients taking drugs was 40%-50% in the research conducted by (Darmon et al) in Rwanda.

The findings of our study demonstrated that there is a significant reduction of liver and renal disorders among the breast cancer patients under chemotherapy. This significant reduction is

possible due to low rate of breast cancer patients or possibly due to sensitization of the ministry of health to keep monitoring or following the clinical health status of these patients.

4.3. SUMMARY OF FINDINGS

In 120 patients studied 12.7% were <0.5mg/dl, and 84.3% were between 0.5 and 1.1mg/dl, 48.8% were < 1.1 mg/dl for creatinine and 2.5% were <5mg/dl, 48.7% were between 5 and 22mg/dl, and 48.8% were <22mg/dl for urea. While 79.5% were between 0 and 35 IU/L, and 20.5% were <35 IU/ L for AST and 87.5% were between 0 and 45 IU/L, 12.5% were < 45IU/L for ALT.

CHAPTER FIVE: GENERAL CONCLUSION AND RECOMMENDATIONS

5.0. INTRODUCTION

5.1. CONCLUSION

Many studies stated that approximately 40–50% of women with metastatic breast cancer will have liver metastasis at some point during the course of their disease according to the study conducted by Nazario and his colleagues and acute renal failure (ARF) in breast cancer patients is a dreadful complication that causes substantial morbidity and mortality according to the study conducted by Darmon et al. Our study did go beyond them because we found that on liver 87.5% do not have liver disease where as 12.5% have and about renal 84.3 % do not present renal disease while 15.7% did.

Based on those, we conclude that patients with breast cancer and who are on treatment have high risk of developing liver and renal disease.

5.2. RECOMMENDATIONS

Based on our results, we recommend that any patient with breast cancer and who is on treatment must be screened for both renal and liver disease and continuous follow up is needed

In addition doctors should take consideration on the harmful effect of some drugs to be given to patient in order to minimize any complication which may occur during the course of treatment of these patients.

We also recommend a deepened researches on drug toxicology before the drugs are applied to human being and our country should elaborate a standard board to cross check or to trace the quality of drugs before their use to patients and also we recommend CHUB to give patient's results in short period in order to be screened immediately this will reduce rate of deaths for those patients .

5.3. SUGGESTION FOR FURTHER STUDY

Deep studies should be conducted in order to get deep information on the effect of chemotherapy on liver and kidney function during the treatment of breast cancer patients. As management of liver and renal failure is very difficult and even is more expensive. And in addition the failure of these organs may increase the rate of morbidity and mortality.

REFERENCES

1. Boive, K.C., 1986. Renal function and laboratory evaluation. *Toxicologic pathology*, 14(1), pp.26-36.
2. Chauhan, P., Yadav, R., Kaushal, V. and Beniwal, P., 2016. Evaluation of serum biochemical profile of breast cancer patients. *Int J Med Res Health Sci*, 5(7), p.1.
3. Darmon, M., Ciroidi, M., Thiery, G., Schlemmer, B. and Azoulay, E., 2006. Clinical review: specific aspects of acute renal failure in cancer patients. *Critical Care*, 10(2), p.211.
4. Fiancé, D.R., 1997. Kidney function. In *Clinical Biochemistry of Domestic Animal (Fifth Edition)* (pp. 441-484).
5. Guray, M. and Sahin, A.A., 2006. Benign breast diseases: classification, diagnosis, and management. *The oncologist*, 11(5), pp.435-449.
6. Harding, F., 2007. *Breast cancer: cause, prevention, cure*. Tekline publishing
7. Makki, J., 2015. Diversity of breast carcinoma: histological subtypes and clinical relevance. *Clinical Medicine Insights: Pathology*, 8, pp.CPath-S31563.
8. Pace, L.E., Mpunga, T., Hategekimana, V., Dusengimana, J.M.V., Habineza, H., Bigirimana, J.B., Mutumbira, C., Mpanumusingo, E., Ngiruwera, J.P., Tapela, N. and Amoroso, C., 2015. Délays in breast cancer presentation and diagnosis at two rural cancer reverra centers in Rwanda. *The oncologist*, 20(7), pp.780-788.
9. Silva, O.E. and Zurrida, S., 2005. *Breast cancer: a practical guide*. Elsevier Health Sciences.
10. Stoll, B., Henry, J., Reeds, P.J., Yu, H., Jahoor, F. and Burrin, D.G., 1998. Catabolism dominates the first-pass intestinal metabolism of dietary essential amino acids in milk protein-fed piglets. *The Journal of Nutrition*, 128(3), pp.606-614.
11. Parkin DM, Bray FI, Devesa SS. Cancer burden in the year 2000- The global picture. *Eur J Cancer*. 2001;37:44– 66.
12. Globocan 2008, Cancer Fact Sheet. Breast Cancer Incidence and Mortality Worldwide in 2008. Available from: <http://globocan.iarc.fr/factsheets/cancers/breast.asp>.
13. Agarwal G, Ramakant P, Forgach ER. Breast cancer care in developing countries. *World J Surg*. 2009;33:2069- 76.

14. 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.
15. Wyld L, Gutteridge E, Pinder SE, James JJ, Chan SY, Cheung KL et al. Prognostic factors for patients with hepatic metastases from breast cancer. *Br J Cancer.* 2003;89(2):284–290.
16. Brown JE, Cook RJ, Lipton A, Coleman RE. Serum lactate dehydrogenase is prognostic for survival in patients with bone metastases from breast cancer: a retrospective analysis in bisphosphonate-treated patients. *Clin Cancer Res.* 2012;18:6348-6355.
17. Xiaoan L, Qing HM, Yuanqing Y, Michelle ATH, Jian G, Xifeng W. Prognostic significance of pretreatment serum levels of albumin, LDH and total bilirubin in patients with nonmetastatic breast cancer. *Carcinogenesis.* 2000;36(2)243–248
18. Devi LI, Ralte L, Ali MA. Serum Biochemical Profile of Breast cancer patients. *European Journal of Pharmaceutical and Medical Research.* 2015;2(6):210-214.
19. Iseki K, Oshiro S, Tozawa M, Iseki C, Ikemiya Y, Takishita S. Significance of hyperuricemia on the early detection of renal failure in a cohort of screened subjects. *Hypertens Res.* 2005;24:691–697.
20. Zhu H, Cao R. The relationship between serum levels of uric acid and prognosis of infection in critically ill patients. *World J Emerg Med.* 2012;3(3):186–190. Yadav R et al *Int J Med Res Health Sci.* 2016, 5(7):1-7

APPENDICES

BREAST CANCER PATIENTS

- 1.MUKARUTAMU Ephrasie
- 2.NYIRANGEZAHAYO Virginie
- 3.NYIRAMAJANGWE Thamar
- 4.NYIRANSENGIYUMVA Therese
- 5.MUKANDAMAJYE Anne marie
- 6.MUKAKIBIBI Angelique
- 7.MUKANKUSI Ancille
- 8.ISHIMWE Diane
- 9.NYIRANGENDABANYIKA
- 10.MUKESHIMANA Angelique
- 11.AYINKAMIYE Anitha
- 12.MUKESHIMANA Alphonsine
- 13.NYIRAMANA Rebecca
- 14.NYIRANEZA Vestine
- 15.UWAMBAJEMARIYA Clessence
- 16.NIKUZE Rachel
- 17.NYIRAMISIGARO Francine
- 18.NYIRANZEYIMANA Christine
- 19.MUKESHIMANA Elina
- 20.MUKAMVUNABA Victoire
- 21.NYIRANEZA Alphonsine
- 22.MUKAGATARE Christine
- 23.INGABIRE Caline
- 24.MUKAMAYUGI Patricie
- 25.KWIZERA Florence
- 26.MUSABYIMANA Basilica
- 27.UWIHOREYE Alphonsine
- 28.AHISHAKIYE Marcianna
- 29.MUKAMABANO Philomene

- 30.AHISHAKIYE Gadeluene
- 31.TWAMBAZIMANA Jacqueline
- 32.INSHUTIZABANYINSHI Beatrice
- 33.MUKASARAMBUYE Veronique
- 34.NYIRAMBONWA Josepha
- 35.UWAMAHHORO Sophie
- 36.NCURINSHUTI Josephine
- 37.MUHAWENIMANA Adeline
- 38.MUKAMUGANZA Josepha
- 39.NYIRAHABINEZA Speciose
- 40.NYIRATABANA Dative
- 41.UWIZEYIMANA Goretti
- 42.UWIZEYIMANA Pacifique
- 43.MUKAMUYANGE Annociatha
- 44.NYIRASAFARI Agnes
- 45.NYIRAKABAMO Laurence
- 46.MUKARWEMA Christine
- 47.NTABUDAKEBA Eugenie
- 48.BUGENIMANA Costasie
- 49.MUKANGWIJE Consolee
- 50.MUKANDIHOREYE Belancille
- 51.YARADUKUNZE Genereuse
- 52.MUKANGENZI Immaculee
- 53.UZAMUKUNDA Emerence
- 54.NYIRAMURUTA Gaudence
- 55.MUKANDORIMANA Anne marie
- 56.MUKANGWIJE Consolee
- 57.CYUBAHIRO Vestine
- 58.NYIRAMANA Veneranda
- 60.NYIRAMINANI Cecile

- 61.NYIRAHATEGEKIMANA Consolee
- 62.UWIMANA Marie Jeanne
- 63.NTAWANYAHEZA Marienne
- 64.NYIRAKARAGWE LIberatha
- 65.MUKARUSAGARA Marceline
- 66.MUKANYANGEZI Beatrice
- 67.MUKANDATISHIMIYE Vestine
- 68.TUYISHIME Anne marie
- 69.MUKAMUGANZA Marie rosee
- 70.NYIRAHITIMANA Viviane
- 71.NYIRANDAMAGE Alvere
- 72.NYIRANGENDAHIMANA Dativa
- 73.MUKESHIMANA Angelique
- 74.MUKARUTAMU Euphrasie
- 75.IGIHOZO Raiham
- 76.MUKANKIKO Peace
- 77.MVITUYIMANA Clessence
78. NYIRAMARIZA Christine
- 79.NIGENA Claudine
- 80.NYIRANGEZAHAYO Vilginie
- 81.MUTUYIMANA Sylvie
- 82.BYUKUSENDE REGINE
- 83.NYIRANDIMUBANZI Yvette
- 84.MUSHIMIYIMANA Josephine
- 85.NYIRANSENGIMANA Dative
- 86.NYIRANSENGIYUMVA Therese
- 87.IRADUKUNDA Kelia
- 88.NYIRABIKARI CECILE
- 89.NYIRANGENDAHIMANA Alexiane
- 90.NYIRAMAREMBO Donatha

91. KAYITESI CONFIANCE
- 92.MUJAWIMANA
- 93.MUKAMPETA Alphonsine
- 94.UWIMANA Angelique
- 95.UWIMANA Therese
- 96.UMURAGWA Lissa
- 97.KANZIGA Consessa
- 98.MUKANDAMAGE Annemarie
- 99.ABIYINGOMA Vestine
- 100.NYIRANKAMICANYE Clarisse
- 101.MUKASHYAKA Aline
- 102.IYABIVUZE Claudine
103. UMUHOZA
104. UWAMAHORO Francoise
- 105.KAMALIZA Jacqueline
- 106.MUKANKUSI Ancilla
- 107.MUKASE Francoise
- 108.MUKAKIBIBI Angelique
- 109.NIYINDORA Vestine
- 110.MUKESHIMANA Beatha
- 111.MUKASENGA Anitha
- 112.NIYODUSABA Jacqueline
- 113.NYIRARWASA Leonille
- 114.ISHIMWE Diane
- 115.NYIRAMANA Donathille
- 116.UMBEREYIMANA Assinatha
- 117.NYIRANEZA Vestine
- 118.UMUTONI Annet
- 119.IRADUKUNDA OLIVE
- 120.NYIRAMANA Jeanette

Appendix1:students project letter



KIBOGORA POLYTECHNIC



STUDENT PROJECT'S LETTER

| |
|----------------------------|
| CHUB - CENTRAL SECRETARIAT |
| Reception Date: 24/07/19 |
| Filing No: |
| Followed by: |
| Received by: |

DATE: 10th July, 2019

To whom it may concern:

We write this letter to humbly request you to allow Mrs **BOLINGO Pascaline** and **MUJAWAYEZU Donata** to conduct project work at **University Teaching Hospital of Butare (CHUB)**


The above mentioned are bonafide students of Kibogora Polytechnic pursuing Bachelor's degree in Biomedical Laboratory Sciences.

This candidate is currently conducting a project entitled "**Evaluation of liver and renal function among breast cancer patients attending CHUB Hospital**"

We are convinced that your institution will constitute a valuable source of information pertaining to their work. The purpose of this letter is to humbly request you to avail them with the pertinent information they may need. We pledge to ensure that all provided information will be used in the strict academic purpose.

Any assistance rendered to the candidate is highly appreciated.

Approved by:


MUNYANDAMUTSA Fulgence
Head of department/Biomedical Laboratory Sciences
Kibogora Polytechnic



Appendix 2:request for data collection



**CENTRE HOSPITALIER UNIVERSITAIRE
UNIVERSITY TEACHING HOSPITAL**

CENTRE HOSPITALIER UNIVERSITAIRE
DE BUTARE (CHUB)
OFFICE OF DIRECTOR GENERAL

Huye, *12.07.2019*

N° Ref: CHUB/DG/SA/07/...../2019
MB

Pascaline Bolingo
Donatha Mujawayezu
Kibogora Polytechnic
Phone: +250784736562

Dear All

Re: Your request for data collection

Reference made to your letter requesting for permission to collect the data within University Teaching Hospital of Butare for your research proposal entitled "*Evaluation of liver and renal function among breast cancer patients attending CHUB*", based to the approval No: RC/UTHB/060/2019 from our Research-Ethics committee, we are pleased to inform you that you are accepted to collect data within University Teaching Hospital of Butare. Please note that your final document will be submitted in our Research Office.

Sincerely,



Dr. Augustin SENDEGEYA
Director General of CHUB

Cc:

- Ag. Head of Clinical Education and Research Division
- Ag. Director of Research
- Chairperson of Research-Ethics Committee
- Ag. Research officer

CHUB

E-mail : info@chub.rw
Website: www.chub.rw

B.P : 254 BUTARE
Hotline: 2030