

**PREVALENCE OF GASTROINTESTINAL TRACT CANCER AND LEVEL OF
MALNUTRITION AMONG PATIENTS ENROLLING INTO CARE
AT UGANDA CANCER INSTITUTE.**

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DECLARATION

I CHEPCHUMBA FRIDA, declare that this research dissertation is my original work and has never been submitted to my institution or academic body for any academic award or publication.

Signature..... Date.....

APPROVAL

This work has been submitted with the approval of my supervisor Ms. Lwanira Catherine of the Department of Biochemistry, School of Nursing Sciences- International Health Sciences University.

Signature..... Date.....

DEDICATION

I dedicate this work to my supervisor, Ms Lwanira Catherine for always being there whenever in need, my mother, Alice Cherop for supporting me financially, my friends who contributed to putting this work together and Dr Obayo Siraji for giving me guidance.

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OPERATIONAL DEFINITIONS

Gastrointestinal tumors- Refers to malignant conditions of the gastrointestinal tract (GI tract) and accessory organs of digestion, including the esophagus, stomach, biliary system, pancreas, small intestine, large intestine, rectum and anus.

Nutrition-refers to the intake of food, considered in relation to the body's dietary needs

Malnutrition-This refers to the condition that develops when the body does not get the right amount of the vitamins, minerals and other nutrients it needs to maintain healthy tissues and organ function.

Severe malnutrition- refers to patients that appeared with BMI $<16 \text{ Kg/m}^2$

Moderate malnutrition -refers to patients that appeared with BMI 16-16.99 Kg/m^2

Mild malnutrition- refers to patients that appeared with BMI 17-18.49 Kg/m^2

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

LIST OF ACRONYMNS

GI	Gastrointestinal
UCI	Uganda Cancer Institute.
WHO	World Health Organization.
IARC	International Agency for research on cancer
CRC	Colorectal cancer.
MUAC	Mid upper arm circumference.
BSA	Body surface area.
BMI	Body mass index
QOL	Quality of life.
WL	Weight loss
PS	performance status
OPD	outpatient department.
ECOG	Eastern cooperative oncology group.

ABSTRACT

Background: Gastrointestinal cancers constitute one of the major health burdens to humans. The available options for treatment of gastrointestinal cancers, including chemotherapy and radiotherapy may impose nutrition risks, especially when patients develop gastrointestinal side effects. The effects may even become adverse if treatment is initiated in patients who are already malnourished. The aim of this study was to determine the prevalence of gastrointestinal cancer types and level of malnutrition in gastrointestinal cancer patients.

Methods: This was a cross sectional study on 288 patients enrolling for care at the Uganda Cancer Institute (UCI). Clinical data and assessment of nutritional status was done with the help of study physicians. The relationship between malnutrition and gastrointestinal cancers was determined using one way ANOVA. For all statistical tests, P-values less than 0.05 were considered significant.

The results: Gastrointestinal lymphomas and esophageal cancer were the most common gastrointestinal cancer types at 34% and 20.2% respectively. Of the total 288 cancer patients that were examined, 34 (11.8%) appeared with severe malnutrition (BMI <16 kg/m²), 27 (9.4%) presented with moderate malnutrition (BMI: 16-16.99 kg/m²), 21 (7.3%) with mild malnutrition. There was a significant difference in the level of malnutrition, according to gastrointestinal cancer type (F-statistic= 8.2; P-value=0.001). More severely malnourished patients had stomach cancer, followed by cholangiocarcinoma (biliarsy) which registered 21.4% patients with severe malnutrition.

Conclusions and recommendations: The prevalence of gastrointestinal lymphomas, esophageal and liver cancer was high more especially among the men and also present among the young population. Larger surveys covering different regions of the country would be needed to provide a more comprehensive picture of the burden of gastrointestinal cancer in Uganda. The information then obtained may guide in planning and development of strategies that may be needed in the provision of appropriate care and treatment of the affected patients, such as free screenings for cancer, and improved accessibility to medical care. In addition, the constitution of an operational nutrition department at the UCI is also highly recommended to screen patients for malnutrition before treatment is initiated more especially among those presenting with stomach and biliary cancer where malnutrition is higher. Nutritional support can be given to these patients and those that are already affected can be further managed at this unit in order to improve their treatment outcomes.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

In this study, the prevalence and level of malnutrition in gastrointestinal patients enrolling into care at Uganda cancer institute were determined. This chapter presents the background to the study, problem statement, the significance of the study, objectives of the study, research questions and the conceptual framework.

1.1 Background

Gastrointestinal (Michael Oresto Munishi et al.) tumours constitute one of the major health burden to man. These include cancers of the oesophagus, gastric, small bowel, colon, rectum, pancreas, liver, biliary tree, lymphatic and neuroendocrine. Globally, these are among cancers with high incidence and mortality. According to the International Agency for Research on Cancer (IARC) report of 2012 (IARC, 2012), approximately 1.4 million individuals lived with a colorectal cancer (CRC) in the world accounting for 10% of all cancers diagnosed while 1.6 million people with CRC died accounting for 19% of all cancer deaths. According to the same report, about 0.8 million died from gastric cancer accounting for 9.6% of all cancer deaths while liver cancer caused 0.7 million deaths accounting for about 8.6% of all cancer death. For pancreatic cancer, over 250,000 people die annually in the world (Hart AR et al., 2008)

In Africa, Gastrointestinal tumors are increasingly becoming common with colorectal cancer reported at 56%, followed by liver at 14.7%, stomach at 12%, oesophagus, pancreas, small intestines and gall bladder all together at 2.5% among a study population in Nigeria (Daramola AO et al., 2009) Regionally, studies from Tanzania and Kenya found oesophageal cancer at 25.3 % (Mbula, 2013) and 19% (Anderson et al., 2002) respectively; stomach cancer at 4.5% (Mabula JB et al., 2012) and 10.7% (MacFarlane sandra et al., 2001) respectively. In Uganda, Kampala Cancer Registry indicated that oesophageal cancer was at 33%, liver cancer at 31% and stomach at 14 % (Wabinga, 2012).

Nutrition plays a major role in many aspects of cancer treatment especially with gastrointestinal cancers (Reeves et al., 2007). Gastrointestinal cancer treatment options which may include

chemotherapy and radiotherapy carry nutrition risk especially when patients develop gastrointestinal side effects like diarrhoea, vomiting mucositis and ulcerations which may lead to inadequate nutrient intake during treatment all of which may result into poor patient's outcomes (Di Fiore F et al., 2007, Unsal D et al., 2006).

The Uganda cancer Institute is the National Cancer Hospital in Uganda with in patients and outpatient departments, serving approximately a population of 35 million people and as well as the neighbouring countries of Rwanda, Kenya, Congo and South Sudan. The Institute takes care of about 4000 patients per year as per the information documented from the Uganda Cancer Institute Record department, among these, are patients with gastrointestinal cancers. Patients with gastrointestinal cancers, who get care, do not get assessed for their level of malnutrition and yet this has implications when patients get chemotherapy or radiation in terms of side effects. There is no available data at the Uganda Cancer Institute regarding the nutritional status of patients with gastrointestinal cancers. Therefore there is need to assess the nutrition status in gastrointestinal cancer patients enrolling into care at Uganda Cancer Institute.

1.2 Problem statement

Gastrointestinal (Michael Oresto Munishi et al.) cancers are increasingly becoming common in Africa, with prevalence reaching over 13% in some countries such as Benin (Okobia MN and Aligbe JU, 2005). Studies done in the region also report an increase in the incidence of gastrointestinal cancers in Tanzania and Kenya, with Uganda alone reporting 25% (Wabinga, 2012). The available options for treatment of gastrointestinal cancers including chemotherapy and radiotherapy may impose nutrition risks especially when patients develop gastrointestinal side effects. The effects may even become adverse if treatment is initiated on patients who are already malnourished (Jockenga et al., 2002, White et al., 2002). This means that initiation of treatment in a malnourished individual may further lead to inadequate nutrient intake and subsequently poor treatment outcomes. Thus, it is critical to identify gastrointestinal cancer patients who are malnourished in order to improve patient outcomes as they start their treatment. Currently, there is limited information pertaining assessment of malnutrition in gastrointestinal cancers patients before treatment in our setting. Thus, in this study, the prevalence of

gastrointestinal cancer types and level of malnutrition in gastrointestinal cancer patients enrolling into care at Uganda Cancer institute was determined.

1.3 Significance of study

In this study, the prevalence and level of malnutrition in gastrointestinal cancer patients enrolling into care at Uganda Cancer institute was determined. Knowledge about the level of malnutrition and gastrointestinal cancer will be useful in:

(a) Improving the knowledge of health workers on the importance of nutrition assessment before cancer treatment and management through continuous medical education based on the findings. This will help identify their strength and weaknesses on nutrition assessment and management of these patients before care.

b) At the Uganda Cancer Institute, this data may be used to address nutrition needs of the patients before initiation of treatment, enhance education programs on nutrition to improve the lives and care as well as preventive strategies for gastrointestinal cancer patients.

(c) To the Policy makers, the findings of this study may be a basis to enable the Ministry of Health and Uganda Cancer Institute develop evaluation and follow up tools for the health workers on nutrition assessment and management in practice particularly for cancer patients.

1.4 Study objectives

1.4.1 General objective

To determine the prevalence of gastrointestinal cancer types and level of the malnutrition in gastrointestinal patients enrolling into care at Uganda Cancer Institute.

1.4.2 Specific objectives

- 1) To determine the prevalence of gastrointestinal cancers among patients enrolling into care at Uganda Cancer Institute.
- 2) To assess the level of malnutrition in gastrointestinal cancer patients enrolling into care at Uganda Cancer Institute.
- 3) To determine the relationship between malnutrition and types gastrointestinal cancer among patients enrolling into care at Uganda Cancer Institute.

1.5 Research questions

- 1) What is the prevalence of gastrointestinal cancers among patients enrolling into care at Uganda Cancer Institute?
- 2) What is the level of malnutrition in gastrointestinal cancers patients enrolling into care at Uganda Cancer Institute?
- 3) What is the relationship between malnutrition and gastrointestinal cancers among patients enrolling into care at Uganda Cancer Institute?

1.6 Conceptual frame work

The conceptual framework is given in the figure 1. Gastrointestinal cancers are among the determinants to malnutrition. As a result of the gastrointestinal tract getting affected with cancer, there is reduction in intake and absorption. This may further worsen especially when the patients are treated and develop chemotherapy, radiotherapy related side effects. Therefore, as indicated in the above conceptual frame work, the dependent variable looked at as the level of malnutrition, while the independent variable was the gastrointestinal cancers. However, there are other determinants of malnutrition that were not investigated in this study such as inappropriate feeding practices, lack of nutrition awareness, infection/infestations other chronic illnesses and genetic diseases. This study looked at the gastrointestinal cancers as one of the factors associated with malnutrition before treatment.

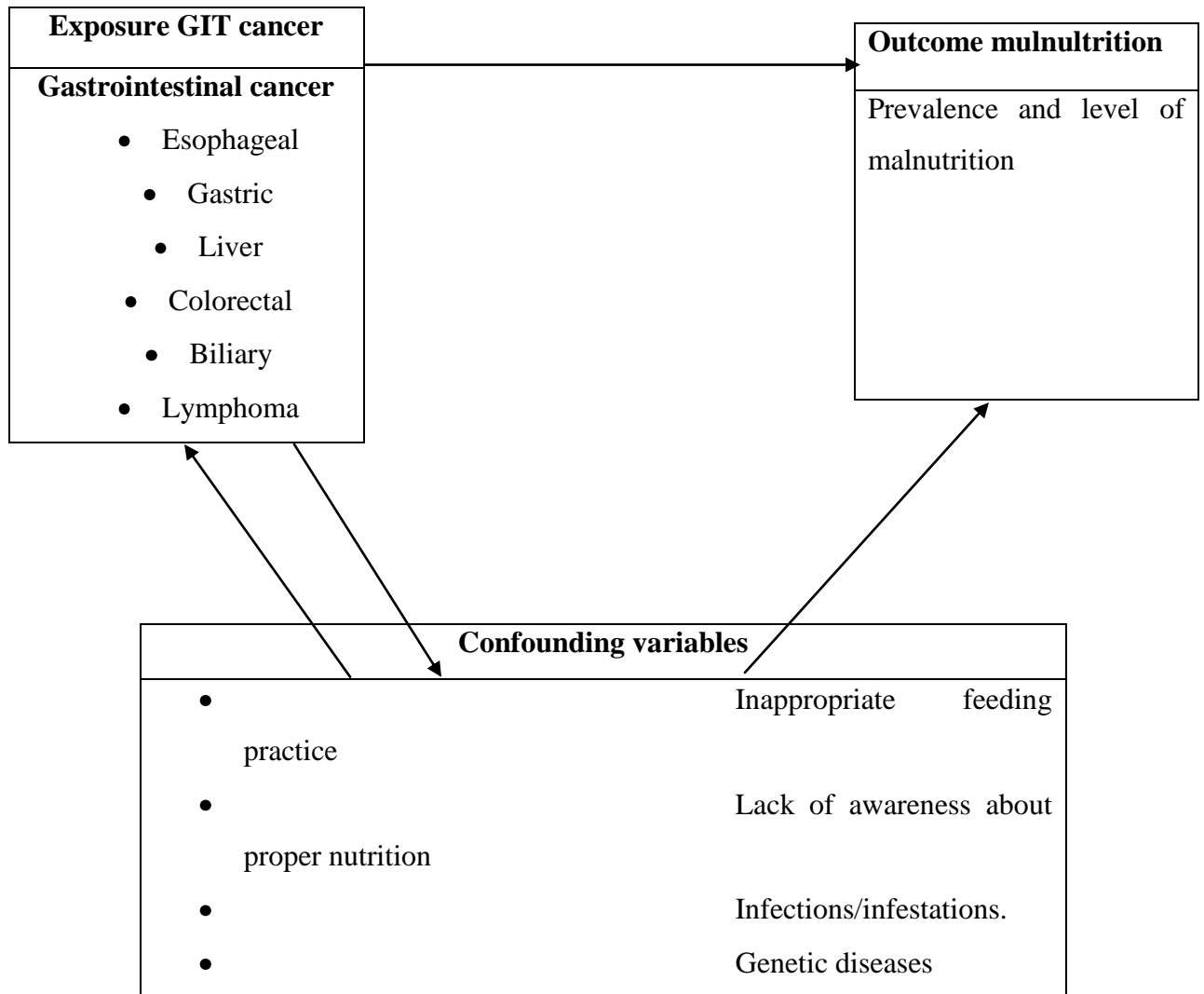


Figure 1: Conceptual framework

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section presents a review of existing literature from previous studies conducted in line with the objectives of the study. The sub themes are presented according to the study objectives and the conceptual framework of the study.

2.1 Overview and prevalence of gastrointestinal cancers

Cancer is a complex disease involving neoplasm of abnormal cells resulting into development of tumour cells. Gene mutations result into inappropriate gene expression and subsequent uncontrollable cellular growth (cancer) (GLOBOCAN, 2012). The reported highest incidence of age-standardized rates of cancer are gastrointestinal cancers which include; - colorectal, stomach, and cancer of the oesophagus (GLOBOCAN, 2012). In some studies Gastrointestinal (Michael Oresto Munishi et al.) cancers have been shown to account for approximately 20% of estimated new cancer cases and 15% of estimated death worldwide (D Forman and Burley, 2006, Jon R. Kelly and Duggan, 2003, Mary Beth terry et al., 2002).

Several epidemiological studies on gastrointestinal cancers have reported that colorectal cancer (CRC) is the second most common cause of cancer mortality especially among the elderly population, comprising of 9% of the global cancer burden and is the most frequent in North America, Australia, New Zealand and parts of Europe (Mary Beth terry et al., 2002, Jon R. Kelly and Duggan, 2003), while gastric cancer is still the fourth most common cancer and the second-third most common cause of cancer death with high incidence particularly in East Asia, Eastern Europe, and parts of Central and South America. In China alone, there are 122.1 thousand new gastric cases and 78.2 thousand new colorectal cancer cases diagnosed each year accounting for 42.7% and 18.1% respectively of the global cases of gastrointestinal cancers. Gastric cancer accounts for 25.1% and colorectal cancer accounts for 28.9 % of all the malignancies in the elderly (Zheng R et al., 2016), while deaths due to gastric cancer are 36.4 % and colorectal cancer death accounts for 44.7% in those people over 75 years old in China (Zheng R et al.,

2016). In Africa, a study that was carried out in a Nigerian population reported highest prevalence of colorectal tumours than other cancers (AbduKareem et al., 2009).

Oesophageal cancer is reported to be the eighth most common cancer worldwide and the sixth most common cause of cancer-related death, and accounts for about 5.5% of all malignant tumours of the gastrointestinal tract (Zheng R et al., 2016) with regional incidence rates highest in areas of Southern and Eastern Africa and China. Stomach cancer is named the fourth most common and the second most common cause of cancer death in the world. The incidence is particularly high in East Asia, Eastern Europe, and parts of Central and South America, and it is about twice as high among men than among women (Hermann Brenner et al., 2009). In some epidemiological studies done in Africa, the East African region has been marked as a hot spot for high incidence of oesophageal cancer. In a recent Tanzanian survey, the prevalence of oesophageal cancer was reported at 25.3 % (Mbula, 2013). In another study that was carried out in a tertiary hospital Bomet, Kenya between 1999 and 2002, oesophageal cancer accounted for 34.6% of newly diagnosed cancers (White RE et al., 2002).

There is reported increase in the incidence of oesophageal cancer particularly among the men. A larger population based study to determine the incidence of oesophageal cancer in four African countries of Malawi, Zimbabwe, Kenya and Uganda also reported higher incidence among males than females (Cheng, 2015). A previous report by National cancer registry of Kenya also showed oesophageal cancer to be the most common among males contributing to 10% of all malignancies (KEMRI., 2013). Reasons given for the increased incidence of oesophageal cancer among the men include to viral infections, alcohol consumption and tobacco use which are very common among the men ((Ju Dong Yang et al., 2015, Vaughan TL et al., 1995), Shivanna & Lohith, 2016; Alemu, 2014)). More recently, increased incidence of oesophageal cancer was also associated with hot tea consumption in a Tanzanian population (Michael Oresto Munishi et al., 2015).

In Uganda, according to cancer registry of Kyadondo County between 1981 and 1991 (Wabinga HR et al., 1993) and in 2003 (Parkin et al., 2003), oesophageal cancer ranked 2nd in Uganda. A more recent study in Uganda by Wabinga and others indicated the prevalence of oesophageal cancer to be at 33% of all cancer cases (Wabinga, 2012). According to Wabinga's study, other

commonly reported cancers in the Ugandan population were liver cancer at 31% and stomach cancer at 14 % (Wabinga, 2012).

Pancreatic cancer has high mortality and ranks as one of the top five causes of death from cancer. The global annual incidence rate for pancreatic cancer is about 8/100,000 persons (Sara Raimondi et al., 2009). Globally, over 250,000 people die annually from pancreatic cancer. The highest prevalence and mortality rates of pancreatic cancer occur in developed countries. The prevalence of pancreatic cancer has increased over the past four decades in developed countries, but plateaued since 1970 at a frequency of 8 and 13 per 100,000 person-years in women and men, respectively (Kashyap et al., 2013). Adenocarcinoma is the commonest form of pancreatic cancer (Sara Raimondi et al., 2009). Slower-growing endocrine tumours account for only a small fraction of the total burden of disease. As for nearly all cancers, incidence rates of pancreatic cancer vary among countries; with approximate 5- to 7-fold differences between countries with the lowest and highest incidence rates reported from African countries are low because of insufficient data.

Fewer studies have documented the prevalence of gastrointestinal lymphomas in African populations. In some African countries such as Nigeria and Egypt, non-Hodgkin's lymphoma was the least prevalent in the Nigerian population (Daramola AO et al., 2009) while gastrointestinal lymphoma was present in only 6.2% and slightly more among the male population in Egypt (M. Saber et al., 2013). Risk factors that have been previously implicated in the pathogenesis of gastrointestinal lymphoma include infections such as *Helicobacter pylori* (*H. pylori*) infection, human immuno deficiency virus (HIV), celiac disease, *Campylobacter jejuni* (*C. jejuni*), Epstein-Barr virus (EBV), hepatitis B virus (Ju Dong Yang et al.), human T-cell lymphotropic virus-1 (HTLV-1), inflammatory bowel disease and immuno-suppression (Prasanna Ghimire et al., 2011) which may not be very common in the studied African populations.

In general, there is variation in the prevalence of cancers in different populations due to many factors including age, gender, tribe, geographical location, differences in exposure to viral infections, alcohol and hot tea consumption, tobacco use (Chen, 2015; Vaughan et al., 1995; Shivanna & Lohith, 2016) plus additional environmental and dietary associations such as mineral

or nutritional deficiencies, lack of protective effect of fresh fruits and vegetables, dietary contamination (WF., 2001, Parkin et al., 2003, Vaughan TL et al., 1995).

2.2 Level of malnutrition among patients with gastrointestinal cancers

Malnutrition refers to excess, deficiencies and imbalances in one's intake of nutrients required by the body (WHO, 2016). The term entails two axes namely; under nutrition and overweight. Patients with gastrointestinal cancers are often susceptible to nutritional deterioration which may be compounded by radiotherapy treatment toxicities. Thus, weight loss and nutritional risk are frequent in patients with gastrointestinal cancers. It has also been observed that the site of primary tumour, stage and performance state of the patient appear to be associated with weight loss and nutritional risk and it is the nutritional depletion that seems to play a major role in the onset of malnutrition in patients with gastrointestinal cancers (Federico E. Rey et al., 2008).

In a study that retrospectively done in Italy at the Division of Digestive Surgery of the Catholic University of Rome evaluated the prevalence and major and minor postoperative complications in patients with gastrointestinal cancers. Findings showed that weight loss and hypoalbuminemia are associated with an increased risk of mortality and morbidity in patients who underwent surgery for gastric cancer (Pacelli et al., 2008). This study highlighted a stimulus for further studies aiming at evaluating the actual role of malnutrition in the development of postoperative complications in major abdominal surgery.

In another study done in united states presented the preliminary data of a prospective multi-centre investigation on the screening of the nutritional status of patients with gastric cancer showed that of 1,000 screened patients, a significant weight loss and a nutritional risk score were observed in 39.7% and 33.8% of patients, respectively (Federico E. Rey et al., 2008). Weight loss was higher in upper gastrointestinal tumours, in advanced stages of disease and in patients with a poor performance status (Federico E. Rey et al., 2008). Similarly, the nutritional risk was higher in oesophageal and pancreatic cancer and in those with a worse performance status. There was a positive correlation between the severity of anorexia and the rate of the weight loss. The majority of patients with no weight loss or a weight loss were not anorectic while the most of those with more severe weight loss had some degree of anorexia (Federico E. Rey et al., 2008).

In a cross-sectional study that aimed to determine whether nutritional status of patients with gastrointestinal cancer at radiotherapy commencement in Australia . Findings showed that

changes in nutritional status throughout radiotherapy were associated with treatment toxicity and outcomes in gastrointestinal cancer patients (Hill et al., 2010). Deterioration in nutritional status during radiotherapy (as measured by weight loss) was associated with poorer short-term treatment outcomes in gastrointestinal cancer patients (Hill et al., 2010).

Some studies have shown that malnutrition and its associated complications are a considerable issue for surgical patients with upper gastrointestinal and colorectal cancer. For instance: a cross sectional study that sought to determine perioperative nutritional practices and protocols are associated with improved patient outcomes in this group (Garth et al., 2010). Findings showed that 32% of gastrointestinal patients experienced moderate malnourished and 16% severely malnourished (Garth et al., 2010). Malnutrition was associated with more hospitalization of patients as compared to well-nourished patients and that the time taken to achieve adequate nutrition in patients with gastrointestinal cancers after undergoing surgery is a major problem post operatively for it has been associated with increased hospital stays, malnutrition and a greater risk of other complications (Garth et al., 2010).

In a cross-sectional study aimed at investigating the prevalence and risk factors of malnutrition in 14,972 hospitalized gastrointestinal cancer patients done at the National Cancer Centre in Korea . Findings showed that about 61% of hospitalized patients were malnourished and the prevalence of malnutrition was higher in male patients with longer hospital stays and readmitted patients (Wie GA. et al., 2010). Patients with advanced cancer stage and longer hospital stay and readmitted patients were at a higher risk for malnutrition (Wie GA. et al., 2010). Therefore, early assessment of those at risk of malnutrition required for proper nutritional intervention during hospitalization of patients with gastrointestinal cancer.

2.3 Relationship between malnutrition and gastrointestinal cancers

In several studies, malnutrition is named a significant factor in predicting gastrointestinal cancer patients' quality of life (QoL). In a systematic review that assessed studies conducted on the role of nutritional status in predicting QoL in cancer. Out of the 26 studies evaluated, 24 reported that better nutritional status was associated with better QoL, while one study concluded that there was no association between nutritional status and QoL (Lis et al., 2012).

Gastrointestinal cancers such as oesophagus and stomach have a major impact on patients' nutritional status due to the importance of these organs in the process of digestion (Elliott et al., 2006). Because majority of these patients require a surgical procedure, this further imposes them to further metabolic demands and compounds pre-existing nutritional disorders (Mariette et al., 2012). According to Mariette et al., 2012, patients with esophago-gastric cancers are likely to have lost weight by the time the diagnosis is made. This fact alone is of clinical importance, because it is well known that patients who have lost weight will have higher operative mortality and morbidity rates than patients who maintain their weight (Mariette et al., 2012). Therefore, initial assessment of patients with esophago-gastric cancers should always include a routine evaluation of nutritional status. This allows identification of patients who are at risk of complications, particularly in the postoperative setting. These patients should be targeted for specific nutritional support (Mariette et al., 2012).

Variations have been reported across different gastrointestinal cancers. In a study done in France on prevalence of malnutrition by disease site was 39.3% in patients with cancer of oesophagus or stomach, 60.2% among patients with pancreatic cancer and 44.8% among patients with prostate (M Pressoir. et al., 2010). Upper gastrointestinal cancers were associated with increased risk of malnutrition and antibiotics while severe malnutrition was independently associated with mortality (M Pressoir. et al., 2010)

In another study done in France on prevalence of malnutrition and current use of nutrition support in patients with cancer found only 28.4% of non-malnourished patients and 57.6% of malnourished gastrointestinal cancer patients received were reported to eat less than before the cancer (Hebuterne X. et al., 2014). Yet clinical malnutrition has been shown to have serious implications for recovery from disease, trauma and surgery and is generally associated with increased morbidity and mortality and additionally increased length of hospital stay and higher treatment costs (Norman et al., 2008).

In patients with gastrointestinal cancer, severe malnutrition has been associated with reduction of treatment efficacy. Ten days of nutritional support is recommended in severely malnourished patients before major digestive surgery. In non-severely malnourished patients, preoperative oral immune nutrition is associated with a 50% decrease in postoperative complications (Senesse et

al., 2008). In fact, it has been recommended that for patients undergoing radio chemotherapy, dietary counselling should be proposed to all patients. In cases of severely malnourished patients or if dietary counselling suffers a setback, enteral nutrition should be recommended. Parenteral nutrition should be reserved for patients with severe digestive intolerance when enteral nutrition is not possible. Propose an adaptive nutritional support at each step of a multimodal GI oncological treatment (Senesse et al., 2008).

The prognostic value of preoperative nutritional factors in patients with pancreatic cancer is not known (Kanda et al., 2010). In a systematic reviewed of studies on the role of nutritional status in gastrointestinal cancer patients, findings showed that correcting malnutrition may decrease the length of stay in hospitals and reduces the rate of hospital readmissions in this population (Karger and Basel., 2011).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter gives a description of the methodology of study and how the study was carried out. It includes the study design, study area, sources of data, study population, sample size, sampling procedures, study variables, data collection tools, quality control, data presentation and analysis, plan for dissemination and ethical issues.

3.1 Study design

This was a cross- section study. At the Uganda cancer Institute outpatient department, approximately 18 new patients with gastrointestinal cancers are seen per week and 72 patients per month. The study was carried out approximately for 4 months during September to December, 2016. With across sectional study approach, data on prevalence and level of malnutrition in gastrointestinal cancer patients was collected at one point in time. This approach was found suitable for determination of the prevalence and level of malnutrition in gastrointestinal cancer patients.

3.2 Study setting

The study was carried out at the Uganda Cancer institute (UCI). The Uganda Cancer Institute is a national cancer centre for cancer treatment, research, and teaching. It serves a Ugandan population of approximately 35 million people maintaining an inpatient facility with a capacity of 80 beds. On average, UCI attends to about 200 patients daily. There are several departments including an Out-Patient Department (OPD) where patients are screened and a gastro intestinal clinic where patients with gastrointestinal cancers are managed.

3.3 Study population

The target population were patients seeking for health care at the Uganda Cancer Institute. For determination of the prevalence and level of malnutrition, adult patients with confirmed diagnosis of gastrointestinal cancer and who had been referred for care at the Uganda Cancer Institute constituted the study population.

3.4 Eligibility criteria

3.4.1 Inclusion criteria

The following was the inclusion criteria

1. Patients above 18 years of age
2. Confirmed cancer patients at first medical oncology visit.
3. No previous anticancer therapies (e.g. radiotherapy or chemotherapy)
4. Patients with diagnosis of lymphomas of gastrointestinal origin on tissue sampling and histopathology result.

3.4.2 Exclusion criteria

The following category of patients was not considered for participation in this study.

1. Patients with gastrointestinal cancers on treatment referred to UCI for continuity of treatment.
2. Known history of chronic illness or infection.
3. Patients who did not consent to participate in the study.

3.5 Sample size determination

The sample size was determined using Kish and Leslie formula given below, assuming an estimated prevalence of gastrointestinal malignancies (25%) determined in by Wabinga et al, 2012 in Uganda. Accordingly, the sample size was determined as follows:

$$N = \frac{Z^2 P (1-P)}{d^2}$$

Where **N** is the sample size,

Z is the confidence level of 95% (1.96).

P is the estimated prevalence of gastrointestinal malignancies (12.9%).

D is the margin of error at 5% (standard of +/- 0.05)

$$\text{Thus, } N = \frac{1.96^2 \times 0.25 (1-0.25)}{0.05^2}$$

$$N = 288$$

Therefore, a total of 288 patients was considered for the study.

3.6 Sampling procedure

Patients were recruited consecutively as they come in for cancer screening. Those with confirmed diagnosis of gastrointestinal cancer were considered for determination of the level of malnutrition.

3.7 Sources of data

This study employed two types of data sources, namely; primary and secondary.

3.7.1 Primary data

This included the clinical data obtained directly from the respondents through self-report and diagnosis. It is the raw data that was used for analysis of the prevalence and level of malnutrition in gastrointestinal cancer patients enrolling into care at Uganda Cancer Institute.

3.8 Study variables

Dependent variable

The dependent variable was prevalence and level of malnutrition

Independent variables

The independent variable in this study was the prevalence gastrointestinal cancers.

3.9 Data collection method and tools

This involved the collection of quantitative data using Clinical investigations on eligible participants, including diagnosis of gastrointestinal cancers and assessment of malnutrition was carried out with the help of physicians at the UCI. Clinical data were obtained as patients report for care at the Uganda Cancer Institute. Thus, for the rapid and accurate capture of data from patients at first contact before initiation of chemotherapy or radiotherapy, the catchment point was the Out-Patient Department where all cancer patients are first assessed and a decision on initiation of treatment is made.

Patient demographics such as age, sex, body weight and height were taken and the body mass indexes (BMI) together with body surface area (BSA) were calculated. Other clinical indicators such as the presence or absence of edema, skin changes and the type of cancer the patient

presents with were also taken. The presence or absence of edema, skin changes and assessment of their performance status was done using the Eastern cooperative oncology group (ECOG) scale.

A patient was considered having severe malnutrition if had Body mass index (BMI) <16, moderate malnutrition if BMI was 16-16.99 and mild malnutrition if BMI was 17-18.49 as specified by the World Health Organisation (WHO, 2006). A full description of data that was collected is described in the Appendix II.

3.10 Data analysis and presentation

Data was cleaned, coded and entered into the Epi-data 3.3. Descriptive statistics were carried out using the Statistical package for social sciences (SPSS) version 20. Descriptive (univariate) data were presented as frequencies and percentages, and illustrated using frequency tables, pie charts and bar graphs. Analysis of variance (ANOVA) was used to analyze the differences among group means of nutritional status (variation among and between groups) and for all statistical tests a P-value of less than 0.05 was considered significant.

3.11 Quality control

Clinical data, including demographics and malnutrition indicators was collected with the help of qualified physicians at the Uganda Cancer Institute. The questionnaire (data collection tool) was first pretested / piloted and standardized or validated before the start of the study.

To protect patient confidentiality, all data entered in the database was de-identified and unique Uganda Cancer patient identification numbers were used. In order to ensure reliability and validity of patient data, all questionnaires were double checked for completeness and approved for storage by the study investigator.

Questionnaires were stored in safety lockers under lock and key only be accessible by the principal investigator and the database was limited via password protection to study personnel.

3.12 Ethical approval

All study protocols were presented for review and approval by an institutional review board of International Health Sciences University School of Nursing sciences and the Uganda Cancer Institute. Permission was sought from the UCI to allow the study to be carried out uninterrupted.

Written informed consent was sought from all study participants before enrollment in the study. Informed consent forms were translated into the local languages of Luganda, as this is the most universally spoken language in Uganda to help us capture the data from patients of different ethnic groups. To protect patient confidentiality, all the information entered on data forms and in the database, was de-identified and unique Uganda Cancer Institute patient identification numbers were used.

3.13 Plan for data dissemination

Results from the study were written into a dissertation book that will be submitted to International Health Sciences University and the Uganda Cancer Institute community. A manuscript will be written for submission to a medical journal and presentation to appropriate conferences.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter reports the finding of the study in line with the study objectives that included (1) to determine the prevalence of gastrointestinal cancers among patients enrolling into care at Uganda Cancer Institute; To assess the level of malnutrition in gastrointestinal cancer patients enrolling into care at Uganda Cancer Institute and to determine the relationship between malnutrition and gastrointestinal cancers among patients enrolling into care at Uganda Cancer Institute.

4.1 Characteristics of the study participants

A total of 288 patients participated in the study and were examined. Majority 179 (62.2%) were females; about 173 60% were above 50 years of age; majority 101 (35.1%) were originating from central region with 47.2% (136 of 288) being peasants as shown in the table 1 below.

Table 1: Social Demographic characteristics of the patients

Variable	Category	Frequency(N=288)	Percentage
Sex	Male	109	37.8
	Female	179	62.2
Age (years)	18-25	16	5.6
	26-49	99	34.4
	≥50	173	60
Region of Origin	Central	101	35.1
	Western	74	25.7
	Eastern	46	15.9
	Others	67	23.3
Occupation	Peasant	136	47.2
	Civil servant	110	38.2
	Student	4	1.4
	Others	38	13.2

4.2 Prevalence of gastrointestinal cancers among patients

Of the 288 patients examined, the majority 98 patients (34%) had lymphoma. Other gastrointestinal cancers were also found including esophageal 58 patients (20.2%), liver 46 patients (16%), stomach 13 patients (4.5%), colon 12 patients (4.2%), rectal 13 patients (4.5%), as shown in the table 2. The least prevalent cancers were scum, Sigmoid, Small intestine, and Duodenum with cecum cancer reporting the lowest prevalence of 2 (0.69%).

Table 2: Prevalence of gastrointestinal cancers

Type of cancer	Number of patients	Prevalence (%)
Lymphoma	98	34.02
Esophageal	58	20.2
Liver	46	16
Pancreas	16	5.6
Cholangiocarcinoma (biliary)	14	4.86
Stomach	13	4.5
Rectal	13	4.5
Colon	12	4.2
Others** (Caecum, Sigmoid, Small intestine, Duodenum)	18	6.24
Total	288	100%

**Caecum, Sigmoid, Small intestine, Duodenum

Data for mean age and age range, the proportion of males to females and distribution according to the region were computed for the three highly prevalent cancers in this study population. The mean age (age range) for patients with gastrointestinal lymphomas, esophageal and liver cancers was 47.3±8.021 (20-60 years), 58.4±13.07 (25-72 years) and 43.2±7.63 (35-79 years) respectively. As shown in the table 3, the prevalence of esophageal and liver cancer was evidently higher among the males than females with a male to female ratio of 3.4:1 for esophageal cancer and 2.6:1 for liver cancer.

Table 3: Age distribution, region and female-male ratio of patients with lymphoma, oesophageal and liver cancer

	Mean age (years)	standard deviation	Age range (years)	Male to female ratio
Lymphoma	47.3	8.021	20-60	1.2
Oesophageal	58.4	13.065	25-72	3.4
Liver	43.2	7.63	35-79	2.6
Region	Central	Western	Eastern	others
Lymphoma	28	18	5	7
Esophageal	36	11	10	8
Liver	20	20	30	15

4.3 Levels of malnutrition in gastrointestinal cancer patients

Of the total 288 cancer patients that were examined, 34 (11.8%) appeared with severe malnutrition (BMI <16 Kg/m²), 27 (9.4%) presented with moderate malnutrition (BMI: 16-16.99 Kg/m²), 21 (7.3%) with mild malnutrition (BMI 17-18.49 Kg/m²) while 206 (71.5%) were not malnourished as shown in the figure 2.

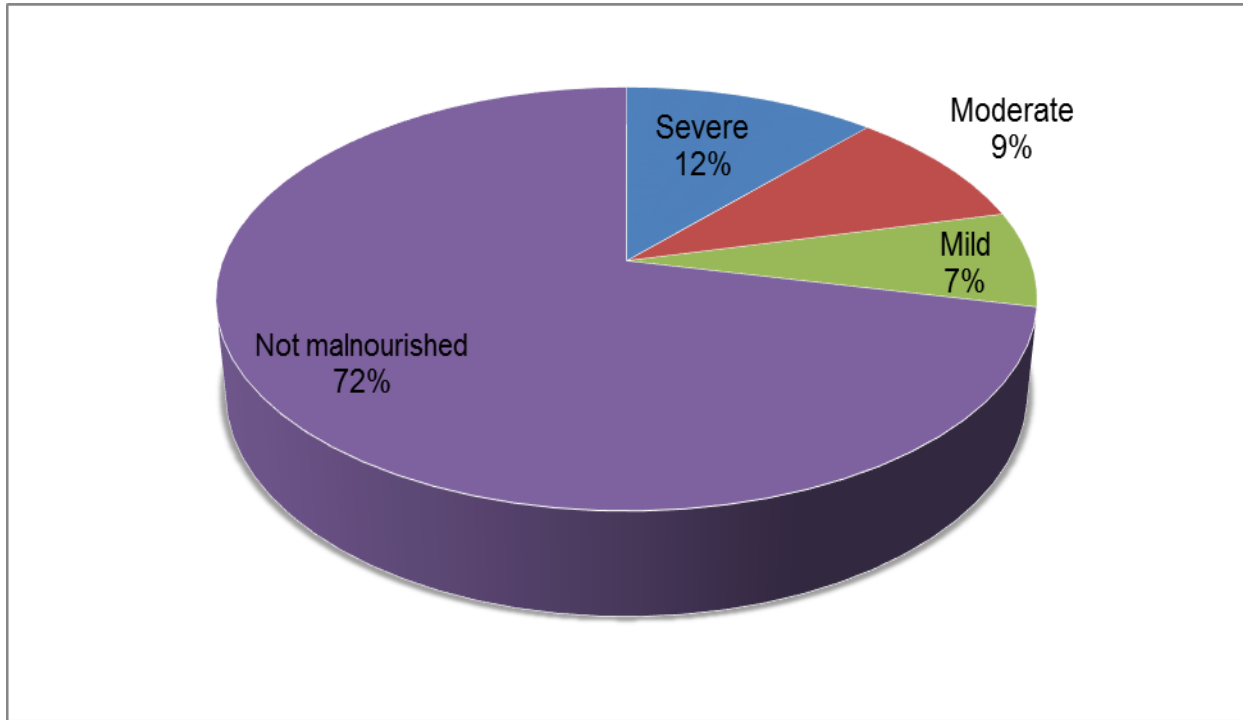


Figure 2: shows the prevalence and level of malnutrition among gastrointestinal patients

Further, this study found that the type of gastrointestinal cancer that surfaced with the least prevalence of malnutrition was liver cancer as 40 (86% of the patients showed no malnutrition,severe malnutrition was noted in majority of the stomach cancer patients 9 (69.2%) followed by cholangiocarcinoma (biliary) which registered 3 (21.4%) patients with severe malnutrition. Details of the prevalence and level of malnutrition, according to gastrointestinal cancer type are given in the table 4 below.

Table 4: Prevalence and level of malnutrition, according to gastrointestinal cancer type

Type of GI Cancer	Malnutrition status, n (%)				Total
	Severe	Moderate	Mild	None	
Esophageal	5 (8.62%)	9(15.5%)	1(1.72%)	43(74.1%)	58(100%)
Stomach	9(69.2%)	1(7.7%)	1(7.7%)	2 (15.4%)	13(100%)
Colon	2(15.4%)	1(7.6%)	-	9 (75%)	12(100%)
Rectal	2(15.4%)	1(7.7%)	2(15.4%)	8(61.5%)	13(100%)
Liver	1(2.2%)	2(4.3%)	3(6.5%)	40(86%)	46(100%)
Cholangiocarcinoma (Biliary)	3(21.4%)	-	1(7.1%)	10(71.4%)	14(100%)
Pancreas	1(6.25%)	1(6.25%)	6(37.5%)	8(50.0%)	16(100%)
Lymphoma	11(11.2%)	12(12.2%)	5(5.1%)	70(71.4%)	98(100%)
Other**	-	-	2(11.1%)	16(88.9%)	18(100%)
Total	34(11.8%)	27(9.37%)	21(7.3%)	206 (71.5%)	288(100%)

**(*Caecum, Sigmoid, Small intestine, Duodenum*)

4.4 Relationship between malnutrition and gastrointestinal cancers among patients

In order to determine the relationship between malnutrition and gastrointestinal cancers, we compared the level of malnutrition across and within the reported gastrointestinal cancer types using one way analysis of variance (ANOVA). One way ANOVA was fitted using the BMI index data as shown in the table 5.

Table 5: Comparison of the mean BMI values among the patients by one way ANOVA

Gastrointestinal cancers	Mean BMI (Kg/m ²)	F-Value	P-Value
<i>Lymphoma</i>	18.3	8.2	0.001*
<i>Oesophageal</i>	17.6		
<i>Liver</i>	19.1		
<i>Pancreas</i>	18.0		
<i>Cholangiocarcinoma (biliary)</i>	16.3		
<i>Stomach</i>	15.2		
<i>Rectal</i>	17.9		
<i>Colon</i>	20.2		
<i>Others**</i>	18.6		

*statistically significant, ** *Caecum, Sigmoid, Small intestine, Duodenum*

On testing the relationship between the Malnutrition and the specific cancer types, a one-way ANOVA was fitted using the BMI index data set and looking at the results above, there was a significant difference in the level of malnutrition according to gastrointestinal cancer type the (P-

value =0.001). This implies that there was a variation in the malnutrition status or severity of the malnutrition across the different GI cancer types.

CHAPTER FIVE

DISCUSSION OF RESULTS

5.0 Introduction

This chapter gives a comprehensive assessment of the study results according to the study objectives, how the current findings relate to other scholar's findings and impact of the current results on policy evaluation regarding care of patients with gastrointestinal cancers.

5.1 Prevalence of gastrointestinal cancers

In this study, patients enrolling into care at Uganda Cancer Institute were examined for gastrointestinal cancers. The least prevalent cancers were scum, sigmoid, small intestine, and duodenal with cecum cancer reporting the lowest prevalence of 2 (0.69%). Notably, of the three most prevalent cancers reported here (gastrointestinal lymphomas, esophageal and liver cancer), the majority of the affected patients were males. The male to female ratio was 1.2: 1 for gastrointestinal lymphomas; 3.4: 1 for esophageal cancer and 2.6:1 from liver cancer. From our results, esophageal cancer was the second commonest cancer in our study population. The 3.4: 1 ratio of males to females with oesophageal cancer also reflects that oesophageal cancer ranks among the leading cancers among the men in this study population. Increased incidence of esophageal cancer has been previously associated with viral infections, alcohol consumption and tobacco use which are very common among the men and could possibly explain the increased prevalence of oesophageal cancer among the men than the women ((Ju Dong Yang et al., 2015, Vaughan TL et al., 1995), Shivanna & Lohith, 2016). More recently, increased incidence of oesophageal cancer was also associated with hot tea consumption in a Tanzanian population (Michael Oresto Munishi et al., 2015).

The finding that esophageal cancer was more common among men in this study is also similar to results from Northern Uganda in which a 3: 1 ratio of men to women with esophageal cancer was reported (Alemu, 2014). The current results also compare with those from a larger population based study in which the incidence of oesophageal cancer was higher among males than females from Malawi, Zimbabwe and Uganda (Cheng, 2015), and a previous report by National cancer registry of Kenya which showed oesophageal cancer to be the most common among males contributing to 10% of all malignancies (KEMRI., 2013). Increased alcohol consumption,

tobacco use, and possibly hot tea consumption as reported in the Tanzanian study (Munishi et al.,2015) could explain the increased occurrence of oesophageal cancer among the men as compared to the women in the present study and earlier studies reported here.

Compared with statistics from neighbouring East African countries, figures reported for the overall prevalence of oesophageal are slightly higher in Kenya and Tanzania. In a recent Tanzanian survey, the prevalence of oesophageal cancer was reported at 25.3 % (Mbula, 2013). In another study that was carried out in a tertiary hospital Bomet, Kenya between 1999 and 2002, esophageal cancer accounted for 34.6% of newly diagnosed cancers (White RE et al., 2002). Differences in exposure to viral infections, alcohol and hot tea consumption, tobacco use (Chen, 2015; Vaughan et al., 1995; Shivanna & Lohith, 2016) plus additional environmental and dietary associations such as mineral or nutritional deficiencies, lack of protective effect of fresh fruits and vegetables, dietary contamination (WF., 2001, Parkin et al., 2003, Vaughan TL et al., 1995) - may account for the variations in the prevalence of oesophageal cancer reported here in comparison with the Kenyan and Tanzanian populations.

When we studied the trend of oesophageal cancer reported by the cancer registry of Kyadondo County between 1981 and 1991 (Wabinga HR et al., 1993) and in 2003 (Parkin et al., 2003), oesophageal cancer still ranked 2nd in Uganda. A more recent study in Uganda by Wabinga and others indicated the prevalence of oesophageal cancer to be at 33% of all cancer cases (Wabinga, 2012). The finding that the prevalence of esophageal cancer was nearly 20% in the present study reflects stagnation in the number of esophageal cancer cases that would require cancer treatment and management. Notably, in earlier studies more numbers were reported in the elderly population as in the study carried out in Northern Uganda in which majority of the patients were between 40-59 years (Alemu, 2014). In our study, the age range of esophageal cancer cases was between 25-72 years. This means that the incidence of this cancer is also increasing among the younger population, which may be attributable to increased alcohol and tobacco use among the young people. Thus, programs aimed at improving care of cancer patients through treatment and improved cancer management need also to cater for the younger population.

Majority of the patients (34%) presented with gastrointestinal lymphomas, with slight predominance among the males (male to female ratio was 1.2: 1). The age range of the affected patients was 20-60 years with a mean of 47.3 ± 8.02 years. Fewer studies have documented the prevalence of gastrointestinal lymphomas in African populations, thus finding such a large number of patients with gastrointestinal lymphomas especially among the younger population could highlight the need for screening for gastrointestinal lymphomas in different populations. Compared with statistics from Nigeria and Egypt where non-Hodgkin's lymphoma was the least prevalent in the Nigerian population (Daramola AO et al., 2009) while gastro intestinal lymphoma was present in only 6.2% and slightly more among the male population in Egypt (M. Saber et al., 2013), we observe a reasonably high prevalence of gastro intestinal lymphoma in the present study, a figure that can't be ignored.

In a previous Ugandan study by Wabinga and others; the commonest cancers reported were oesophageal cancer (33%), liver cancer at 31% and stomach cancer at 14% (Wabinga, 2012). Risk factors that have been previously implicated in the pathogenesis of gastrointestinal lymphoma include infections such as *Helicobacter pylori* (*H. pylori*) infection, human immunodeficiency virus (HIV), celiac disease, *Campylobacter jejuni* (*C. jejuni*), Epstein-Barr virus (EBV), hepatitis B virus (Ju Dong Yang et al.), human T-cell lymphotropic virus-1 (HTLV-1), inflammatory bowel disease and immuno-suppression (Prasanna Ghimire et al., 2011). With an increase in the prevalence of these infections even in the young population in our setting, it is likely that the incidence of gastrointestinal lymphomas may increase over time, thus it becomes important to concurrently screen for gastrointestinal lymphomas towards improved patient care and management.

Liver cancer was the third most common cancer in our study at 16% prevalence and more among the males. The mean age of affected patients was 43.2 ± 7.63 years, indicative of the increased prevalence among the younger population. In a previous Ugandan study by Wabinga (Wabinga, 2012), liver cancer was found at a prevalence of 31%. Whether there has been a reduction in the prevalence of liver cancer from 2012 needs to be confirmed by larger surveys. However similar to previous studies, the high prevalence of liver cancer was seen the younger population that could be due to increase in hepatitis B infection (Ju Dong Yang et al., 2015). which is very

common in our setting, increased drug and aflatoxin exposure (Clarrisa Afum et al., 2016) and in previous studies; an increase in the prevalence of liver cancer and non-Hodkins lymphoma was associated with the introduction of antiretroviral therapy (Innocent Mutyaba et al., 2015). But also, more risk for liver cancer may likely be among the males.

Other relatively common cancers in the present study were stomach, colon and rectal cancer. The least common were caecum, sigmoid, small intestine, and duodenal cancers. In another study done in Tanzania, stomach cancer was also reported at 4.5% which is close to the prevalence of stomach cancer reported here (Mabula JB et al., 2012). However, the prevalence of stomach cancer reported by Wabinga and others in Uganda was 14 % (Wabinga, 2012). It is possible that the prevalence of stomach cancer could have decreased from the figure reported back in 2012, although larger surveys are needed to confirm this trend. However, an increased risk of stomach and oesophageal cancer is reported among people with AIDS (Persson EC et al., 2012), although in the present study, patients with known history of chronic illness were excluded and we can't confirm this association.

Another study in a Nigerian population on the contrary reported highest prevalence of colorectal tumors than other cancers (AbduKareem et al., 2009). In general, there is variation in the prevalence of cancers in different populations due to many factors, including age, gender, tribe, geographical location, environmental and dietary exposure, infections among others. This calls for the need for screening for the different cancer types among different populations in order to offer appropriate care to the affected populations.

5.2 Levels of malnutrition in gastrointestinal cancer patients

In this study, we found 9.4 % of the patients with moderate malnutrition and 11.8% with severe malnutrition. Most cases of malnutrition were registered among patients with stomach cancer; 69.2% of these were presented with severe malnutrition with an average body mass index of 15.2 Kg/m². This was followed by cholangiocarcinoma (biliary) in which 28.5% were malnourished and had mean body mass index of 16.3 Kg/m². The proportion of those with severe malnutrition was 21.4%. Other cases of malnutrition were registered among patients with oesophageal cancer with 8.6% of these having severe malnutrition and an average body mass index of 17.6 Kg/m². In

previous studies cases of malnutrition have been reported among patients with stomach and oesophageal cancer which is attributable to the major role of these organs in digestion (Mariette et al., 2012).

Patients with oesophageal and stomach cancer normally present with feeding challenges and malabsorption even after surgery (Heneghan HM et al., 2015). These factors and other likely dietary influences such as lack of knowledge of proper feeding, infections, worm infestations and genetic factors may explain the occurrence of malnutrition among these patients. However, in our study, we did not examine possible infections or worm infestations or even genetic factors, all of which are potential confounders that could influence the malnutrition status among these patients. Additionally, we did not assess the dietary history of the patients at recruitment. However, our results are also in line a study Ethiopia which found oesophageal and stomach cancer to have a major impact on patients' nutritional status by virtue of these organs' role in digestion (Mariette et al., 2012).

A study done in 2010 by Pressoir also indicated that the prevalence of malnutrition varied by disease site with 39.3% in patients with cancer of oesophagus or stomach, 60.2% among patients with pancreatic cancer and 44.8% among patients with prostate. Upper gastrointestinal cancers were associated with increased risk of malnutrition (M Pressoir. et al., 2010).

From our study, out of the 14 patients with Cholangiocarcinoma (biliary) 3/4 (75%) were more severe while out of the 13 patients with stomach cancer, 11 were severely malnourished and 9/11 (81.8%) were more severe malnutrition. A similar study done in Korea (E.S. Kim, 2015) identified Biliary and stomach cancer patients' malnutrition were more severe 94.7% and 72.7% respectively. This could be because malnutrition is common among cancer patients, although unintentional malnutrition may be associated with decreased quality of life and a poorer prognosis. Nutritional problems are more common in the gastrointestinal (GEI) organs. However, this study had higher levels of both severe and moderate malnutrition of 35.4% and 41.9%, respectively, compared to the 11.8% and 9.37% for severe and moderate malnutrition respectively, but this difference could be due to the difference in the geographical regions but generally this implies that malnutrition is more severe among patients with stomach cancer.

5.3 The relationship between malnutrition and gastrointestinal cancers

There was a significant difference in the level of malnutrition across the different gastrointestinal cancer types. The mean body mass index for the patients with lymphoma (18.3 Kg/m²) oesophageal (17.6 Kg/m²), pancreas (18.0) Cholangiocarcinoma (biliary)(16.3 Kg/m²), Stomach (15.2 Kg/m²) Rectal (17.9 Kg/m²) were all underweight (BMI <18.5 Kg/m²) according to the world health organisation. Only colon and liver cancers had mean BMI greater than 18.5 Kg/m². This finding implies that there was a variation between the malnutrition status or severity of the malnutrition across the different GI cancer types. This is true with our findings and in line with a study done in Korea (E.S. Kim, 2015) where severity of malnutrition was more for some types of gastrointestinal cancers which were Biliary cancer and stomach cancer.

Another study done in France showed that only 28.4% of non-malnourished patients and 57.6% of malnourished gastrointestinal cancer patients were reported to eat less than before the cancer (Hebuterne X. et al., 2014). This also shows a correlation between gastrointestinal cancer and feeding of a patient which later affects their nutritional status. Another study done in china identified that the prevalence of severe malnutrition among gastrointestinal cancer patients increased from 2.3% to 26.3% after an operation (Hongjin Shim. et al., 2013). This confirms that there is a relationship between malnutrition and gastrointestinal cancers to be addressed.

The finding of a relationship between malnutrition and gastrointestinal cancers is also in line with a systematic review study on the role of nutritional status in gastrointestinal cancer patients done in USA. Findings showed that correcting malnutrition may decrease the length of stay in hospitals and reduces the rate of hospital readmissions in this population (Di Fiore F et al., 2007). Another study on the Role of nutrition in gastrointestinal oncological patients done in Italy also confirmed that a paradox exists in the relationship between nutrition and cancer. Gastrointestinal Cancer has a profound impact on patients' physical function, and nutrient and energy metabolism are altered. Lean body mass and fat tissue is lost because of accelerated proteolysis and lipolysis, while muscle protein synthesis is depressed. Additionally, carbohydrate metabolism is modified by tumour growth, resulting in increased hepatic glucose production because of reduced hepatic and peripheral insulin sensitivity, favoured by systemic proinflammatory processes. These alterations contribute to increase energy expenditure and may

result in progressive muscle and fat tissue wasting, since hyper-metabolism is not compensated by increased food intake (R. DI LUZIO et al., 2010).

In Iran, a prospective study on clinical assessment of malnutrition in patients with Gastrointestinal Cancer found a significant relationship between duration of treatment after chemotherapy and the average of mid arm circumference (MAC) and body mass index (BMI) (Reza Eghdam Zamiri. et al., 2014). Since malnutrition was found mostly among patients with stomach and biliary cancer, it may be important to screen these patients for malnutrition before treatment is initiated so as to improve their treatment outcomes.

5.4 Study limitations

Some limitations to this study have to be mentioned.

1. This was a cross sectional study and we were unable to infer causality from our findings.
2. The malnutrition status of a cancer patient may be influenced by factors that were not measured in our study, such as income level, feeding practices, other infections/diseases, worm infestations and genetic factors.
3. Assessment of malnutrition status was based on BMI and clinical examination. We did not carry out a more definitive biochemical assessment to obtain a wider scope of possible dietary deficiencies.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

In this study, it was found that in every 100 gastrointestinal cancer patients, 34 had gastrointestinal lymphomas, 20 had esophageal cancer, while 16 had liver cancer. There were more males than females with esophageal and liver cancer. Also notable is that gastrointestinal cancers were noted among the younger population below 30 years of age.

Of the total 288 cancer patients that were examined, 34 (11.8%) appeared with severe malnutrition (BMI <16 kg/m²), 27 (9.4%) presented with moderate malnutrition (BMI: 16-16.99 kg/m²), 21 (7.3%) with mild malnutrition.

Results from this study also showed there was a significant difference in the level of malnutrition according to gastrointestinal cancer type. More severely malnourished patients had stomach cancer, followed by cholangiocarcinoma (biliary) which registered 21.4% patients with severe malnutrition.

6.2 Recommendations

From our study findings, the prevalence of gastrointestinal lymphomas, esophageal and liver cancer was high more especially among the men and also present among the young population. Larger surveys covering different regions of the country would be needed to provide a more comprehensive picture of the burden of gastrointestinal cancer in Uganda. The information then obtained may guide in planning and development of strategies that may be needed in the provision of appropriate care and treatment of the affected patients, such as free screenings for cancer, and improved accessibility to medical care.

We also recommend constitution of an operational nutrition department at the UCI to screen patients for malnutrition before treatment is initiated more especially among those presenting with stomach and biliary cancer where malnutrition is higher. Nutritional support can be given to these patients and those that are already affected can be further managed at this unit in order to improve their treatment outcomes.

6.3 Areas for further research

A larger prospective longitudinal study assessing the effect of macronutrient and micronutrient supplementation on treatment outcomes among patients with gastrointestinal cancers is recommended.

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APPENDIX I: INFORMED CONSENT FORM

STUDY TITLE: PREVALENCE AND LEVEL OF MALNUTRITION IN GASTROINTESTINAL CANCER PATIENTS ENROLLING INTO CARE AT UGANDA CANCER INSTITUTE.

PURPOSE OF THE STUDY

This research study is being done to improve your care in the hospital and also to help with further management of such illness using the results obtained. . In this study, the relationship between malnutrition and gastrointestinal cancers among patients at the Uganda Cancer Institute shall be determined.

HOW THE STUDY IS DONE

You will be assessed for the level of malnutrition this will be done in the outpatient department at the Uganda Cancer Institute by taking your weight, height, skin thickness and hair changes.

RISKS AND DISCOMFORTS

There are no risks and discomforts involved in this study.

BENEFITS

There are no direct benefits to the patients participating in this study. However, this will benefit those patients who will come for care in the future. This data will instead have the following benefits:

- (a) Improving the knowledge of health workers on nutrition assessment before cancer treatment and management.
- b) At the Uganda Cancer Institute, this data may be used to address nutrition needs of the patients before initiation of treatment, enhance education programs on nutrition to improve the lives and care as well as preventive strategies for gastrointestinal cancer patients.
- (c) To the Policy makers, the findings of this study may be a basis to enable the Ministry of Health and Uganda Cancer Institute develop evaluation and follow up tools for health workers on the nutrition assessment and management in practice, particularly for cancer patients.

COST/PAYMENT

After enrollment in the study, you will not be charged for assessment. You will not be paid for participation in the study.

VOLUNTARY PARTICIPATION

Your participation in this study is completely voluntary. You will also have the right to request and see the information collected during this study.

USE OF THE RESULTS

The findings from this study may be published in a medical journal. You will not be identified by name. After the study is completed, you may request an explanation of the study results.

IMPLICATION OF YOUR SIGNATURE OR THUMBPRINT

In case you agree to participate in this study, you will be required to sign or place your thumb print on the consent page. Your signature or thumb print below means that you understand the information given about your participation in the study and in the consent form.

CONSEQUENCES OF WITHDRAWAL

Should you decide to withdraw from the study at the beginning, then no further action can be taken.

INFORMED CONSENT PAGE

Study Title: Prevalence and Level of Malnutrition in gastrointestinal cancer patients enrolling into care at Uganda Cancer Institute.

I, declare that I have understood the objectives and purposes of this study.

I agree to participate in this study. I am aware that I can withdraw from the study at any time without any consequence to me.

Name.

Signature or Thumbprint.

Date/Time

Chepchumba Frida.

International Health Sciences University.

0772027083.

f.chepchumba@ihsu.ac.ug.

IHSU REC Chairperson

Dr Samuel Kabwingu.

0772595233.

UNCST

Dr. Julius Ecuru.

0772595233.

LUGANDA INFORMED CONSENT FORM

OBUNGI NEKWATAGANA ELI MUDYA EMBI NO'BULWADDE BWA KOKOLO'WOMUBYENDA KU UGANDA CANCER INSTITUTE.

OMUGASO GWO'KUNONYEREZA.

Ebigenda okuva mukunonyereza'kuno bigenda kuyamba okutereza mubujanjabu'obwabalwadde bakokolo'womubyenda. Muguno'musomo, tugenda kulaba enkwatagana eli'mundya embi noburwadde bwa kokolo'womubyenda ku Uganda Cancer Institute.

OKUNONYEREZA KUKOLEDWA KUTYA?

Mugenda kukebelebwa endya yamwe nga mupimibya obuzito bwamwe, obuwanzu, endabikka ye ensusu zamwe n'enviri wari abalwadde webatukila mu Uganda Cancer Institute.

OBUZIBU BWO'YINZA OKUSANGA MUKUNONYEREZA KUNO.

Tewali buzibu bugenda kuva'mukunonyereza kuno'bwo.

EBIRUNGI EBIRI MUKUNONYEREZA KUNO.

Ebinava mukunonyereza bigenda kuyamba'basawu mungeri zino wamanga;

(a) okwongera obumanyilivu mukwekebejja endya yabalwadde nokujanjabu obulwadde bwakokolo.

b) ebinava mukunonyereza bigenda kuyamba Uganda Cancer Institute, okulongosa munya yabarwadde nokutegeka emisomo ezigenda okuyamba okutangira endyadde yakokolo.

OKUSASURA OBA OKUSASULIBWA.

Wobanga wegasse mumusomo guno, togenda kusasula oba okusasulibwa.

OKWEGATA MUMUSOMO KWA KYEYAGALIRE.

Okwegata mukunonyereza kwa'kyeyagalire. Oliwadembe okulaba ebivudde mukunonyereza nga'kuwedde.

.

ENKOZESA Y'EBINAVA MUKUNONYEREZA.

Ebinava mukunonyereza bigenda kutekebwa mu magazine zebwyobulamu. Temutya, amanya gamwe tegagenda kulabikira mubigenda okuzurwa ate dembe'lyamwe okunyonyorwa ebinababivudemu.

OMUGASO GWA LAAMAYO/EKINKUMU

Wobawakiriza okwegata mukunonyereza kuno, osabibwa okutekako labayo oba enkinkumu. Ekinkumu oba lamayo, etegeza nti wanyonyodwa era ekiwandiko kino’kitegera bulungi’nyo.

EBIYINZA OKUTUKAKO SINGA OGANA OKWETABA MUKUNONYEREZA KUNO.

Wobasazewo’kwabulira omusomoguno kurwensonga ezitalizimu, togenda kukosebwamungeli jobadde ofunamu’bujanjabi wanokudwaliro. Dembe lyo okuvamu woba oyagalidde wona ate notokosebwa mu byobujanjabi bwo.

OKUKIRIZA OKWETABA MUKUNONYEREZA KUNO.

OBUNGI NEKWATAGANA ELI MUDYA EMBI NO’BULWADDE BWA KOKOLO WOMUBYENDA KU UGANDA CANCER INSTITUTE.

Nzenjatula nti ntegedde ebigendelerwa ne emigaso eziri mukunonyereza kuno.

Nze nzikiriza okwegata mukunonyereza kuno. Nkimanyi nti nzikirizibwa okuva mumusomoguno’buude bwona nga sikosedwa.

Erinya.....

Lama oba ekinkumu

Date/Time

Chepchumba frida.

International health Sciences University.

0772027083.

f.chepchumba@ihisu.ac.ug.

IHSU REC Chairperson

Dr Samuel Kabwingu.

0772595233.

UNCST

Dr. Julius Ecuru.

0772595233

APPENDIX II: QUESTIONNAIRE

PTID # _____ UCI ID # _____

1. Demographics of the patient.

Age _____ Sex Male Female

District of origin / residence _____

Occupation: Peasant Civil servant Student Others

2. Type of cancer of the patients:

Oesophageal Stomach Duodenum Small intestinal

Colon Rectal Sigmoid Caecum Liver

Cholangiocarcinoma (biliary) Pancreas lymphoma

Other

3. Anthropometry measurements of the patients.

Weight (kg) _____ Height (cm) _____ MUAC _____

BSA _____ BMI _____

4. Examination of the patients.

Performance status: ECOG: 0 1 2 3 4

Presence oedema Yes No

Skin changes Yes No

Hair Changes Yes No

APPENDIX III: INTRODUCTORY LETTER



making a difference in health care

Office of the Dean, School of Nursing

Kampala, 08th August 2016

TO THE EXECUTIVE DIRECTOR UCI
UGANDA CANCER INSTITUTE
MULAGI
.....
.....

Dear Sir/Madam,

RE: ASSISTANCE FOR RESEARCH

Greetings from International Health Sciences University.

This is to introduce to you **Chepchumba Frida**, Reg. No. **2012-BNS-FT-015** who is a student of our University. As part of the requirements for the award of a Bachelors degree in Nursing of our University, the student is required to carry out research in partial fulfillment of her award.

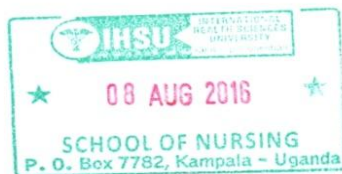
Her topic of research is: **Prevalence and Level of Mal-Nutrition in GastroIntestinal Cancer Patients Enrolling Into Care at Uganda Cancer Institute.**

This therefore is to kindly request you to render the student assistance as may be necessary for her research.

I, and indeed the entire University are grateful in advance for all assistance that will be accorded to our student.

Sincerely Yours,

Ms. Agwang Agnes
Ag. Dean, School of Nursing



The International Health Sciences University
P.O. Box 7782 Kampala - Uganda
(+256) 0312 307400 email: aagwang@ihsu.ac.ug
web: www.ihsu.ac.ug

APPENDIX IV: CORRESPONDENCE LETTER



Uganda Cancer Institute

Upper Mulago Road, P.O. Box 3935, Kampala, Uganda. Fax: +256 414 530 729, Phone: +256 414 540 410, Website: uci.or.ug

Ref: REO/AC/ 002

15th Nov 2016

To: Ms. Frida Chepchumba – 0772027083
Student of Bachelors of Nursing Sciences Degree
International Health Sciences University.

RE: **Permission to Conduct Research at Uganda Cancer Institute (SR: 066)**

Reference is made to your letter of request dated 08th Aug 2016 submitted to UCI on 04th Nov 2016 concerning your intent to conduct a research at the Uganda Cancer Institute (UCI) with a protocol entitled **“Prevalence and level of Malnutrition in Gastrointestinal Cancer Patients Enrolling into Care at the Uganda Cancer Institute”**. Permission to conduct the research at UCI was granted given that this study is of minimal risk to participants and it was reviewed and approved by the International Health Sciences University Research and Ethics committee. you are trained in human subject protection, you availed a copy of your proposal, and paid the charge equivalent to \$30 as part of the requirements for clearance.

Please take note of the following issues as you conduct research at UCI:


- i) You and other study staff will be governed by the rules that govern the conduct and discipline of Public Officers.
- ii) Abide by the National Council for Science and Technology (UNCST) regulations for conducting research involving human participants and all relevant regulations.
- iii) Provide copies of your research assistants training on human subject protection to the Research and Ethics Review Office before you begin data collection.
- iv) Ethical code and participant confidentiality are very pertinent so should be maintained at all times.
- v) Ensure that your research assistants are well trained on the study. Your contact person or Supervisor at UCI is Sr. **Nankoma Janet** at **0752935529** you are expected to work closely with her throughout your conduct of research at UCI.
- vi) Provide a copy of your report at the end of the study to the UCI Research and Ethics Review office .

This offer can be terminated in case you do not adhere to research ethics during your study conduct.

By copy of this letter, the UCI Clinical head, and Outpatient department incharge are informed about your study and strongly urged to take action in case any malpractices are observed as you conduct research at UCI.

RESEARCH IS OUR RESOURCE

Sincerely,


Dr. Jackson Orem
The Director, Uganda Cancer Institute

- C.C. The Head Research and Training, UCI
- “ The Hospital Administrator, U.C.I.
- “ UCI Clinical Head
- “ Sr. Nankoma Janet (Supervisors)

