Assessment of Nutritional Status of Cancer Patients in National Institute of Cancer Research Hospital (Nicrh), Dhaka, Bangladesh

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Abstract: *The present study intended to evaluate the nutritional status of Cancer patients undergoing therapeutic treatment and associated complications as well as quality of life outcomes. Weight loss and malnutrition are common among cancer patients, these two factors greatly affecting survival and quality of life during treatment. Since cancer is becoming increasingly common in the Bangladesh and nutrition is an important part of cancer treatment in order to provide better treatment measure, it is important to assess nutritional status. This study conducted from November 2016 to January 2017 to assess the nutritional status of one hundred and six randomly selected cancer patients in National Institute of cancer Research Hospital (NICRH), Dhaka. The assessment carried out using all the four direct method of nutritional assessment including anthropometric measures, bio-chemical or laboratory tests, clinical indicators and dietary assessment. The collected data were analyzed using computerized methods of analysis (SPSS and Microsoft Office Excel). The prevalence of cancer among the patients was 64% (female) and 36% (male). According to BMI only 23.02% were within standard range and the remaining 45.50% were under weight, 12.02% overweight, 10.98% obese class-I, 6% obese class-II and 2%were suffering from morbid obesity. The HB levels of 45 patents (42%) were below 10.4g/dl, 57 patients (54%) were in the range of 10.4-15.6g/dl and 4 patients (4%) are above 15.6g/dl among 106 cancer patients. Only 29.24% were taking nutritional supplement. Common complications of cancer patients like leucopenia (18.5%in male &25.2% in female), nausea, vomiting, asthenia, fever and diarrhea were identified. Regular assessment of nutritional status and proper nutritional treatment should be an essential part of cancer treatment in Bangladesh. Malnutrition has a high prevalence in cancer patients and has a close relationship with mortality, morbidity and treatment-related problems and also quality of life.*

Keywords: *Nutritional status; Cancer patients; NICRH*

I. Introduction

Nowadays, Cancer is a chronic disease that directly affects the region of onset and causing a variety of complications and loss of progressive organ function. Moreover, Chemotherapy therapy affects nutritional status through alterations on the metabolic system and reduction in food intake. Cancer is one of the foremost reasons of morbidity and mortality all over the sphere (Sharma, 2012; Sumanpreet Kaur and Sukhraj Kaur, 2015). It is the second most frequent cause of death in Europe and it has becoming the leading cause of death in old age(European Commission Health Report, 2001; Boyle and Ferlay, 2004). Chemotherapy treatment especially is associated with several side effects like nausea, vomiting, oral mucositis, xerostomia, diarrhea, constipation, and food aversion (Bincy&Beena, 2014; Calixto-Lima *et al.,* 2012). Which is responsible for decreased food intake, nutrient loss, energy expenditure alterations and weight loss, particularly lean body mass.Increasing death of cancer patients not only for their prevalence of disease but also unconcern about dietary habits.Malnutrition is an obstacle in cancer patients (Muscaritoli*et al.* 2017). It impairs immune status and reduces body's defense against infectious diseases.163 million people lives in Bangladesh, there are 13 (0.8125%) to 15(0.9375%) lakh cancer patients in Bangladesh, with about two lakh patients afresh diagnosed with cancer each year (Hussain, 2013). As an overview, lung cancer and mouth-oropharynx cancer rank as the top two prevalent cancers in males. Other types of cancers are esophagus cancer and stomach cancer. In women,

cancer cervix uteri and breast cancer are most prevalent. Other cancer types, which affect women, are mouth and oropharynx cancer, lung cancer, and esophagus cancer (Hussain 2013; Hussain and Sullivan, 2013). Approximately, 56 cancer chemotherapeutic agents are obtainable in Bangladesh. Research facilities are available at tertiary care centers and a few multi-country collaborative research activities are ongoing (Hussain 2013). Bangladesh has a unique National Cancer Control Strategy and Plan of Action 2009-2015 formulated with the assistance of WHO with an objective to develop and implement continuum of cancer care through a comprehensive cancer control program. Preventive measures taken to reduce the incidence of cancer include reduced tobacco smoking, change of dietary habit and reduced food adulteration, ensuring reproductive hygiene, increased physical activity, and reduced occupational hazard (Hussain, 2013). Studies have demonstrated that anywhere from 30% to 87% of cancer patients are diagnosed with malnutrition, with 30–60% of cancer patients diagnosed with protein-calorie malnutrition with higher rates of as much as 80% observed in esophageal cancer patients (Yuwei Zhang, 2013). The prevalence of malnutrition as high as 67% has been observed on ovarian cancer patients, while only 6% of endometrial cancer patients were malnourished (Laky *et al.*, 2013; Kumar, 2012). Others have observed that more than 64% of cancer patients were malnourished, increasing to 81% for patients undergoing palliative care. In clinical observations studies, over 95% of cancer patients indicate one or more symptoms involving the gastrointestinal (GI) tract contributing to compromised nutritional status (Kumar, 2012). Malnutrition is thus a recurrent expression of cancer besides a momentous provider of morbidity and mortality. Now days, cancer is a major health burden worldwide. A projected 12.7 million new-fangled cancer belongings ensued with 7.6 million deaths (round 13% of all deaths) in 2008. Incidence and mortality rates of most cancers are increasing in several less developed countries due to adoption of unhealthy lifestyles like smoking, physical inactivity and consumption of calorie-dense food. 2 In the 1960s, almost 25% of global cancer burden was diagnosed in low-income and lower middle-income countries (Laky *et al.*, 2013; Kumar, 2012). In 2010, nearly 55% of the global cancer burden was found in these countries. By 2030, over 9 million cancer patients are assumed to die in developing countries (Parveen*et al.*, 2015; Uddin *et al.*, 2013). Globally, the most prevalent types of cancers were breast (5.2 million), colorectal (3.2 million), prostate (3.2 million), lung (1.67 million), stomach (1.6 million), cervical (1.5 million), urinary bladder (1.1 million), liver (0.6 million), and esophageal cancer (0.48 million) in 2008. Cancer is the sixth common cause of mortality in Bangladesh and 60% of cancer patients die within five years of diagnosis. Lung cancer in male and cervical and breast cancer in female constitute 38% of all cancer cases in Bangladesh. In some studies, it is found that cervical cancer is the most common cancer in women of reproductive age in Bangladesh and most patients come for diagnosis and treatment when it is too late.6 There are 1.3 to 1.5 million cancer patients in Bangladesh, with about 0.2 million patients newly diagnosed with cancer each year. At present, most common cancers in Bangladeshi male are lung, mouth-oropharynx, esophageal and stomach cancers. In women, cancer cervix and breast cancer are the most prevalent followed by cancers of mouth-oropharynx, lung and esophagus (Uddin *et al.*, 2013). In 2002, an estimated 11 million new cancer cases and 7 million cancer deaths were reported worldwide; nearly 25 million persons were living with cancer (Kamangar*et al.*, 2016). Among the eight most common cancers, global disparities in cancer incidence, mortality, and prevalence are evident, likely due to complex interactions of non-modifiable (i.e. genetic susceptibility and aging) and modifiable risk factors (i.e., tobacco, infectious agents, diet, and physical activity). The economic impact of cancer affects individual households and the public health economy (Hussain and Sullivan, 2013). Two Hospital-based Cancer Registries in Bangladesh showed that 66% of the cancer patients are in the age group 30–65 years, the main workforce structure of a country (National Cancer Control Strategy and Plan of Action, 2009-15; Hussain and Sullivan, 2013). Bangladesh is not able to provide the latest treatment facilities for cancer management and hence government's support is inadequate. Every year Bangladesh is losing a huge amount of foreign currency for this purpose. The overall cancer management could reach the South-East Asian regional level if the government would invest one quarter of this amount for the next 4 years (Hussain and Sullivan, 2013). The present study is conducted to assess the nutritional status of sampled cancer patients undertaking treatment in National Institute of Cancer Research Hospital (NICRH), Dhaka.

II. Methods and Materials

STUDY AREA AND PERIOD
The study was conducted in National Institute of Cancer Research Hospital in the center of Dhaka, Bangladesh. This area is chosen to collect proper information from target population for data collection. This study was conducted for a period of 3 months starting from 1-November-2016 to 5-February-2017.
STUDY POPULATION
The study population was cancer patients of National Institute of Cancer Research Hospital (NICRH) in Dhaka, Bangladesh. The patients were from various districts of Bangladesh. One hundred and six patients were selected purposively for interview.

DATA COLLECTION INSTRUMENT
The study was conducted by a standard questionnaire to collect the data from the respondent. The questionnaire was based of questions which included the information about type of disease, overall nutritional status ,side effect of chemotherapy,24 hour dietary recall method, biochemical method, and other related factors.

DATA COLLECTION TECHNIQUE
Before starting the data collection, basic information of the location was collected. Data were collected by face to face interview.

PROCEDURE FOR MEASURING HEIGHT
Height was measured without shoes, with the subject standing fully erect on a flat surface. Heels, buttocks and should be flat on the measuring wall, which should be straight, and the subject should look straight ahead (a line between the angle of eye and the upper point of attachment of ear should be horizontal). Fixing a measuring tape to the wall and measuring the height with a movable headboard with a sufficient vertical dimension to ensure constancy of the measuring wall. The headboard must be in contact with the topmost point of the head with sufficient pressure to compress the hair and height was taken to the nearest o.1 centimeter.

PROCEDURE FOR MEASURING WEIGHT
Weight was taken with light cloths and without shoes by a modern digital bathroom scales placed on a flat surface. The weight was recorded to the nearest 0.1 kg.

BODY MASS INDEX (BMI)
Body Mass Index is a standardized ratio of weight to height. It can be calculated by dividing the weight (in kilogram) by the square of the height (in meter). A composite index of anthropometric measure was derived from height and weight. Body mass Index of the subject was calculated using standard formula.
BMI = Weight in kg /(Height in meter)^2.
Patients are categorized based on WHO standard range: <18.5 kg/m^2 (underweight), 18.5-24.9 kg/m^2 (acceptable/normal weight), 25-29.9 kg/m^2 (overweight), >30kg/m^2 (obese).

HOUR DIETARY RECALL
24 hour dietary recall is classified into five steps to collect different kinds of information about foods consumed during the 24 hours period of the previous day. This recall method helps respondents to think about their food & drinks intake in different place within 24 hour. The methodology help respondents for remembering & reporting foods they have eaten.

DATA ANALYSIS
At the end of the day of data collection, individual questionnaire was edited through checking and rechecking to see whether it was filled completely and consistently. Then the data were entered into the computer, with the help of software SPSS (Statistical Package for the Social Sciences).

III. Results

DISTRIBUTION OF RESPONDENTS AMONG CASE GROUP AND GENDER
The percentage of cancer patients among male and female whereas 64% patients are Female and 36% patients is Male within 106 cancer patients in NICRH, Dhaka, Bangladesh (Figure 1).
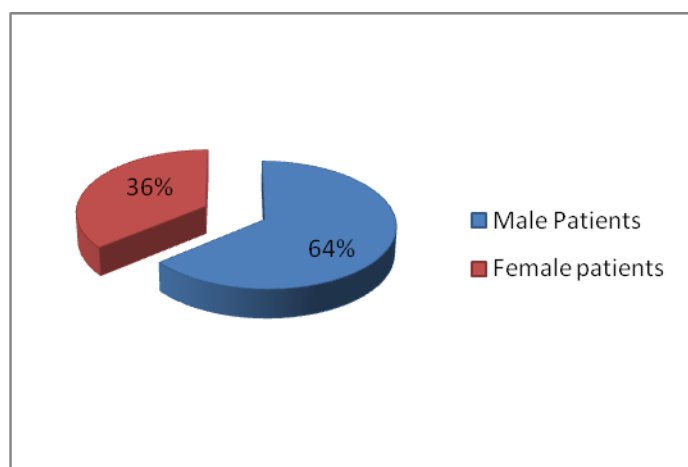

Figure 1: Respondents among case group according to their gender.

COMPLICATIONS AFTER CHEMOTHERAPY IN MALE CANCER PATIENTS
The percentages of side effects after chemotherapy the in male cancer patients. It is presenting that 18.5% patients are affecting by leucopenia, 25.6%are affecting by nausea, 31% are affecting by vomiting, 5.9% are

affecting by asthenia, 7% are affecting by fever, 5%are affecting by mucositis and 14% are affecting by diarrhea (Figure 2).
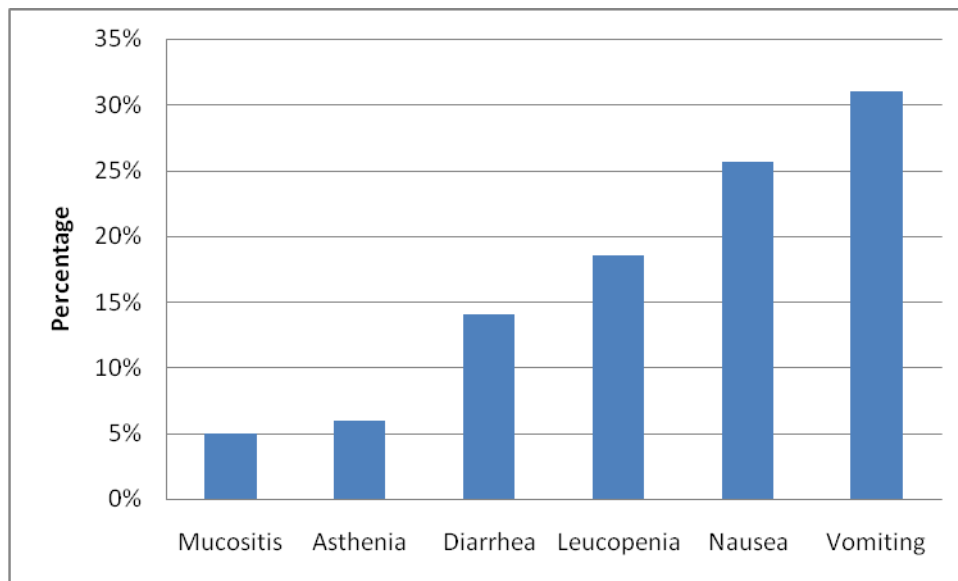

Figure 2: Percentage of complications after chemotherapy in male cancer patients.

COMPLICATIONS AFTER CHEMOTHERAPY OF FEMALE CANCER PATIENTS
The percentage is presenting that 25.2%patients are affecting by leucopenia 34.5% are affecting by nausea, 19.3% are affecting by vomiting, 5% are affecting by asthenia, 6.7% are affecting by fever, 5%are affecting by loss of appetite and 4.3% are affecting by diarrhea (Figure 3).
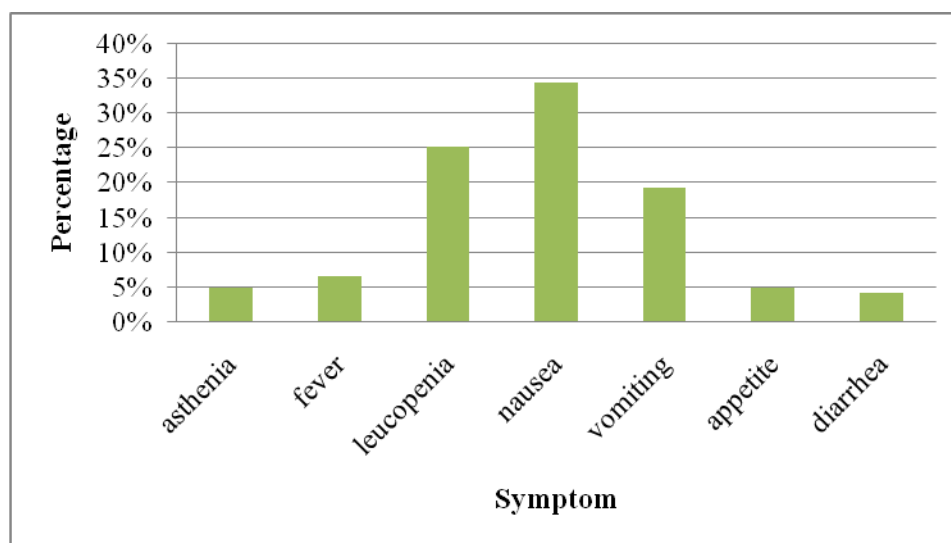

Figure 3: Percentage of complications after chemotherapy of female cancer patients.

NUMBER OF PREVALENCE OF CANCER IN MALES IN NICRH
The number of prevalence of cancer disease among male, 15 men are with lung cancer, 9 men are with colorectal cancer, 5men are with stomach cancer, 4 men are with liver cancer, 3 men are with blood cancer, 2 men are with bladder cancer among 38 men.
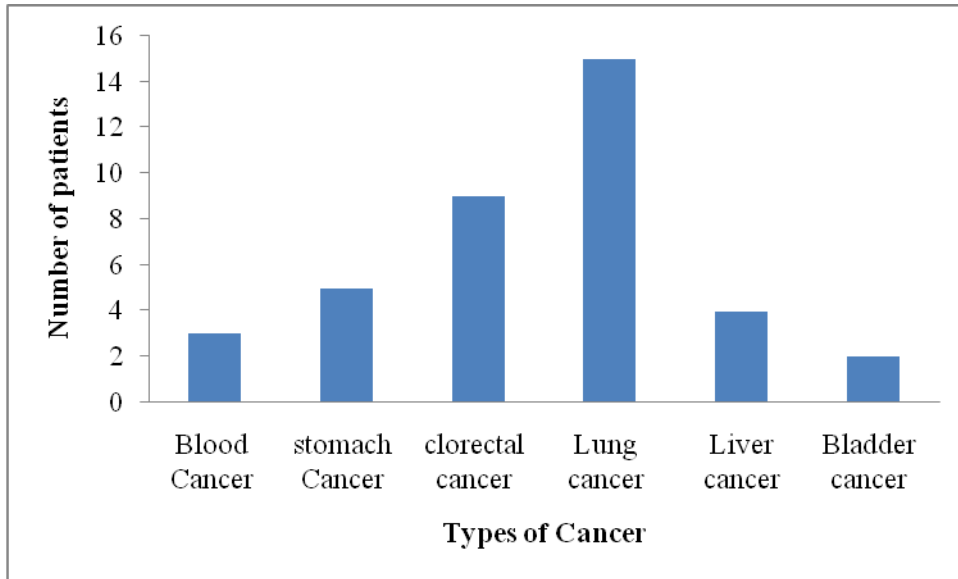
Figure 4: The number of prevalence of cancer in males in NICRH.

NUMBER OF PREVALENCE OF CANCER IN FEMALES IN NICRH

The number of prevalence of cancer disease among female, 29 women are with breast cancer, 12 women are with colorectal cancer, 16 women are with ovarian cancer, 6 women are with lung cancer, 3 women are with liver cancer, 2 women are with blood cancer among 68 women (Figure 5).
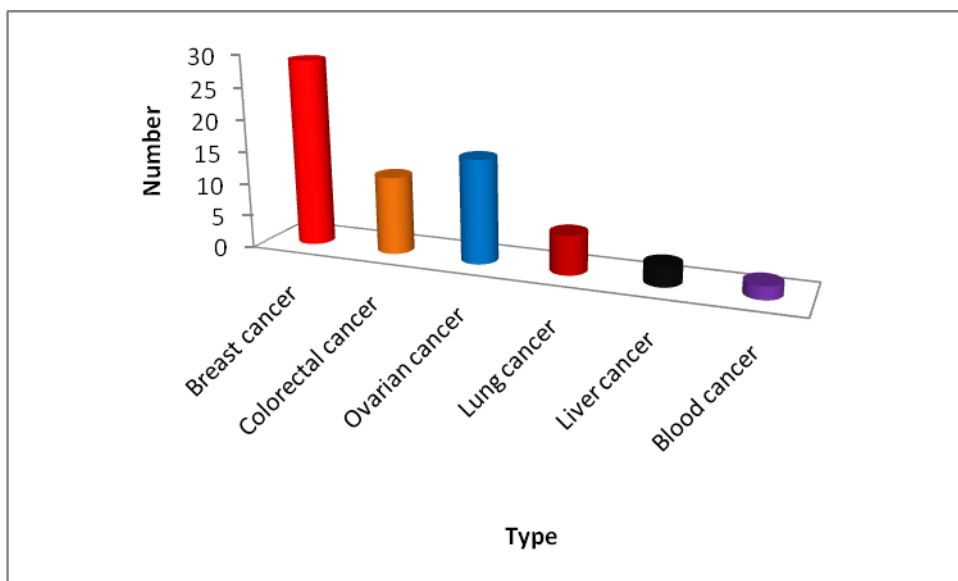

Figure 5: The number of prevalence of cancer in females in NICRH.

CONDITION OF NUTRITIONAL SUPPLEMENT AMONG PATIENTS

It was observed, 75 patients do not take nutritional supplement where 31 patients intake dietary supplements. It shows that more than half of the cancer patients do not take any nutritional supplement, and it is main culprit to leads malnutrition (Figure 6).
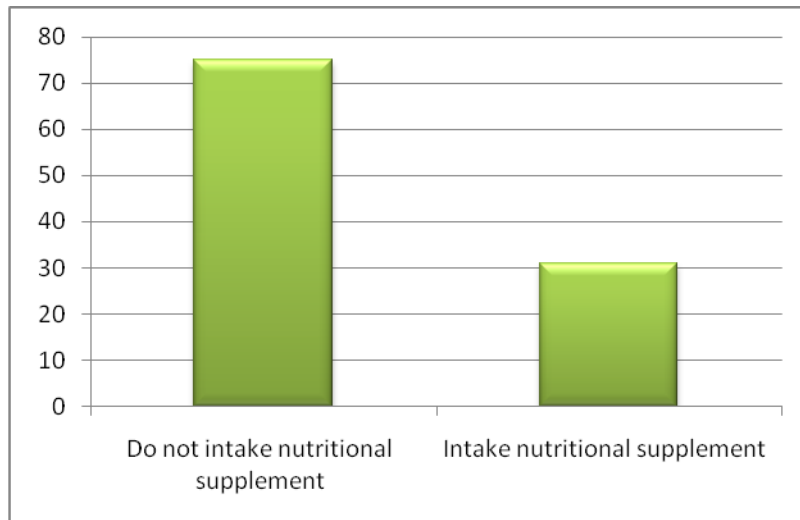
Figure 6: The condition of nutritional supplement Amon patients in NICRH.

PATIENTS SUFFERING CANCER WITHIN DIFFERENT AGE RANGE

Here, 12.7% are affected by cancer that are below 30 years old, 23.3% are with cancer who are between 30-40 years old, 29.58% are affected by cancer who are between 40-50 years old and finally 34.42% are with cancer who are above 50 years old. In this survey, we found that above 50 years old people were suffering by cancer disease. (Figure 7)
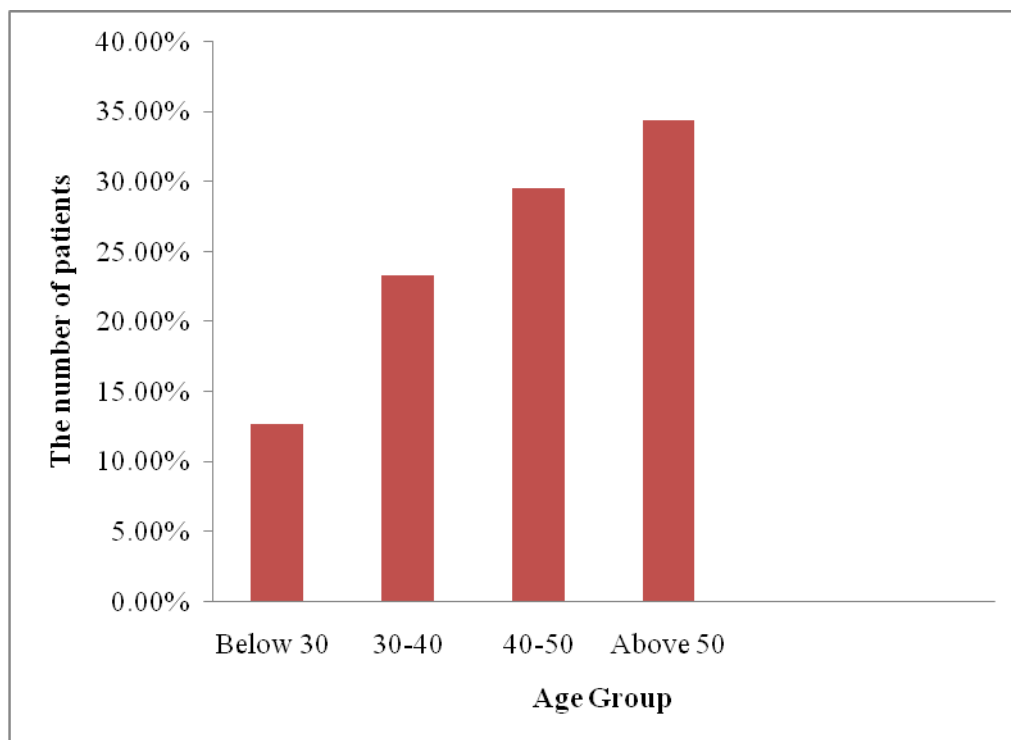

Figure 7: patients suffering from cancer disease within different age range.

NUMBER OF SMOKER AND NONSMOKER MALE CANCER PATIENT

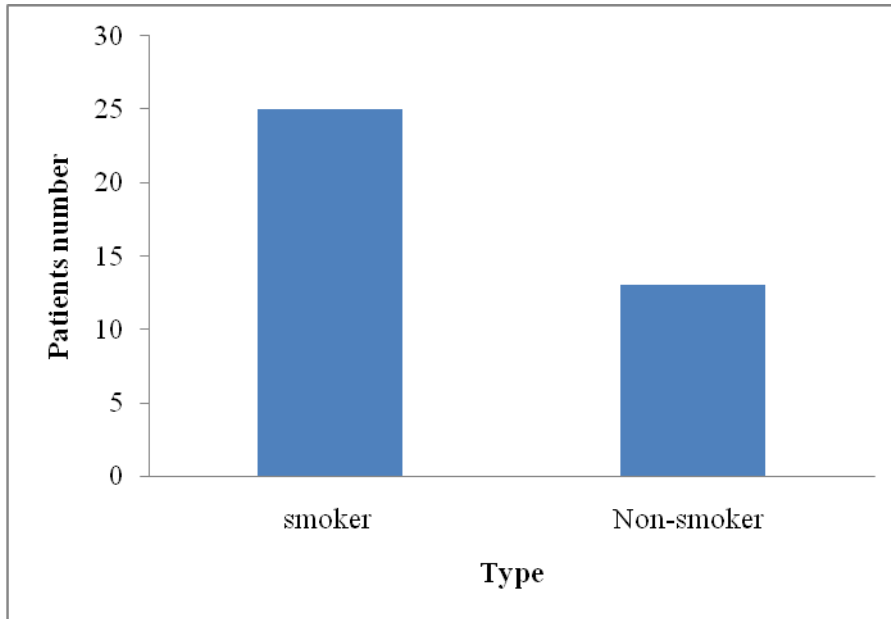Among 38 male patients it is showed that 25 male are smoker and 13 male are nonsmoker (Figure 8).

Figure 8: Number of smoker and nonsmoker person among male cancer patient.

NUMBER OF PATIENTS HAVING BASIC KNOWLEDGE ABOUT CANCER DISEASE
Here, 85 patients do not know about cancer disease and prevalence while 21 patients have knowledge about cancer as well as treatment. (Figure 9)
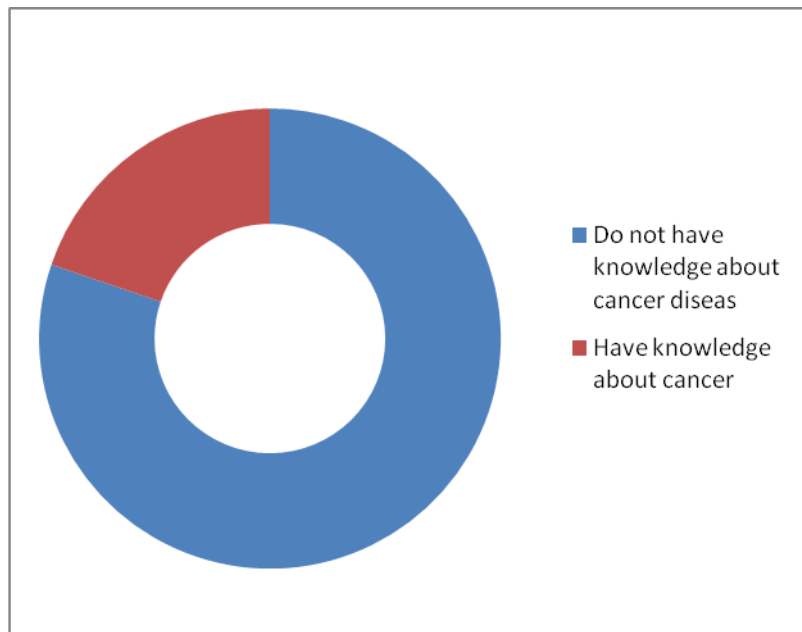

Figure 9: The number of patients who have basic knowledge about cancer disease.

DISTRIBUTION OF RESPONDENTS ACCORDING TO HEMOGLOBIN LEVEL
The HB level of 45 patients (42%) is below 10.4g/dl, the HB level of 57 patients (54%) is in the range of 10.4-15.6g/dl, the HB level of 4patients (4%) is above15.6g/dl among 106 cancer patients. These hemoglobin levels (g/dl) are taken after chemotherapy and these levels are fluctuating among the cancer patients in NICRH (Table 1).

Table 1: Distribution of respondents according to hemoglobin level.

Hemoglobin (g/dl) Level	Frequency	Percentage (%)
<10.4	45	42%
10.4-15.6	57	54%
>15.6	4	4%
Total	106	100%

DISTRIBUTION OF RESPONDENTS ACCORDING TO BODY MASS INDEX (BMI).
It is showing that among 106 patients 45.50% (47 patients) of respondents have underweight,.23.02% (25 patients) are enjoyed normal healthy weight, 12.50% (13 patients) have over weight,10.98%(11 patients) are obese class I, 6%(7 patients) are obese class II, 2%(3 patients) are in morbid obesity (Table 2).

Table 2: Distribution of Respondents according to Body Mass Index (BMI).

Severity	BMI/ Kg/m2	Frequency	Percent
Under weight	<18.5	47	45.50%
Normal weight	18.5-24.9	25	23.02%
Over weight	25-29.9	13	12.50%
Obese class I	30-34.9	11	10.98%
Obese class II	35-39.9	7	6%
Morbid obesity	>=40	3	2%
Total		106	100%

IV. Discussions

In this research the prevalence of cancer disease was estimated according to sex. Among 106 patients, 64% were female & 36% were male in NICRH. Female patients were more affected by cancer than male patients which number is relevant with Sharma *et al.* (2014) study. In this study, the number of prevalence of different types of cancer disease also estimated within 106 patients in NICRH. Among 38 male cancer patients 15 men were with lung cancer, 9 men were with colorectal cancer, 5men were with stomach cancer, and 4 men were with liver cancer, 3 men were with blood cancer, 2 men were with bladder cancer which study is conducted first time in Bangladesh. On the other hand, among 68 female cancer patients 29 women were with breast cancer, 12 women were with colorectal cancer, 16 women were with ovarian cancer, 6 women were with lung cancer, 3 women were with liver cancer, 2 women were with blood cancer among 68 women. The findings indicated that maximum female was attacked by breast cancer. Cancer patients were suffering from different types of complications during anticancer treatment all of which can directly or indirectly affect their nutritional status. The percentages of the side effects during chemotherapy in male cancer patients were estimated. The study found that 18.5%patients were affected by leucopenia, 25.6% were affected by nausea, 31% were affected by vomiting, 5.9% were affected by asthenia, 7% were affected by fever, 5% were affected by mucositis and 14% were affected by diarrhea. Again, the study also estimated the percentage of the side effect during chemotherapy in female cancer patients. 25.2% patients were affected by leucopenia, 34.5% were affected by nausea, 19.3% were affected by vomiting, 5% were affected by asthenia, 6.7% were affected by fever, 5% were affected by loss of appetite and 4.3% were affected by diarrhea. The findings were mentioned that majority percent of patients had a complication of nausea which is relevant with the study of Nho*et al.* (2014); Barthelemy*et al. (*2014); Jagoe *et al. (*2001); Mohan and John (2013); Jager-Wittenaar *et al. (*2011); Langius *et al. (*2013); Bossola, (2015). Hence, there are other factors about cancer patients like cancer location treatment type, swallowing ability, oral ulcers, dry mouth, dental problems, eating ability and etc that need to be attended by consultation and supportive clinics (Kubrak and Jansen, 2007). These changes in weight were not statistically significant. Weight changes are valuable indicators of nutritional risk. Assessment of changes in body weight over time can be a more informative indicator of nutritional decline (Salimmohammed and Daoud, 2013). The study calculated the number and percentage of cancer disease among different age group.12 people (12.72%) were affected by cancer who were below 30 years old, 26 people (27.72%) were with cancer who are between 30-40 years old, 33 people (34.5o%) were affected by cancer who were between 40-50 years old, 35 people (36.1%) were with cancer who are above 50 years old among 106 patients of NICRH. It is indicated that majority percent of patients who were in the age of above 50 years old were affected by cancer which is relevant with the study of Bossola, (2015); Barthelemy*et al. (*2014); Langius *et al. (*2013); Nho*et al.* (2014); Jagoe *et al. (*2001); Mohan and John (2013) and Jager-Wittenaar *et al. (*2011). Bangladesh is one of top countries that make-up two-thirds of the world population of smokers. The study also revealed that some male cancer patients were

involved with smoking regularly. Among 38 male patients 25 male (66%) were smoker and 13 male (34%) were nonsmoker. So smoking is an etiology of those patients suffering from different types of cancer which is relevant with the study of Barthelemy*et al. (*2014); Jagoe *et al. (*2001); Mohan and John (2013) and Bossola, (2015). The study also showed that about 32 patients (30%) of the patients don't have basic knowledge about the cancer they are suffering from. There are no previous researches conducted in Bangladesh in such matter.From the biochemical report of hemoglobin test only 54% of the respondents had normal range of hemoglobin (10.4-15.6g/dl), 42% were anemic (<10.4g/dl) and only 4% were in above >15.6g/dl. This high percentage of anemia indicates poor nutritional management of those patients which will lead the treatment more complicated.This study also found from the BMI of cancer patients of 106 patients 45.50% (47 patients) of respondents were underweight, 23.02%(25 patients) were in normal healthy weight, 12.50% (13 patients) had over weight, 10.98%(11 patients) were in obese class I, 6(7 patients) were in obese class II, 2%(3 patients) were in morbid obesity. That is about 76.98% of the patients were suffering from malnutrition (Underweight & over weight) which was alarming and more or less similar with the study of Bincy and Chacko, (2014); Calixto-Lima *et al.,* (2012); Sharma, (2012) Sauer and Voss, (2012). This changes onthe BMI among cases is positively associated with increase intake of chemotherapy, the present studies were inagreement with previous studies that found variation onBMI after receiving chemotherapy dose (Bincy R. &Beena Chacko, 2014; Litton et al., 2007) Also this variation in weight was proved byprevious studies stated, increased and decreased weight bydoses of chemotherapy (Griggs et al., 2005). The study estimated the dietary information using 24 hour recall method which showed that patient's intake the balanced diet, provided by NICRH during hospital stay. Due to the complications of chemotherapy, they were suffered from various side effects such as nausea, vomiting, fever, diarrhea etc which all can affect their nutritional status. The diet provided by the hospital was well balanced but the rate of high malnutrition indicate that it can be due to their complication or faulty dietary habitat household level which need to be further investigated. Unintentional weight loss was reported in cancer patients and regarded as a stronger variable for detection of malnutrition than BMI. To prevent the weight loss, NICRH provided the various snacks foods such as fruits, biscuits etc. according to cancer type patients. The study also estimated the percentage of nutrient supplement intake of 106 cancer patients. 75 patients did not intake nutrient supplement but only 31 patients intake nutrient supplement which can also have a high impact on nutritional status which is relevant with the study of Bincy and Chacko, (2014); Geirsdóttir and Thorsdottir, (2008); Calixto-Lima *et al.,* (2012); Sharma, (2012).

V. Conclusion

In conclusion, while the prevalence of cancer disease among men and women were extremely high, under nutrition and over nutrition both was significantly higher comparatively normal body weight which leads to malnutrition. On the other hand, cancer patients do not get sufficient amount of supplement to fight against disease. However, we recommend that the Nutritional assessment on cancer patients should be routinely assessed among the cancer patients.

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