Prevalence of Variegated Cancers and Comparison of Chemotherapies in Bangladesh

Safa Binte Hossain[1], Mesbah Talukder[2]

[1]*(Department of Pharmacy, BRAC University, Bangladesh)*
[2]*(Department of Pharmacy, BRAC University, Bangladesh)*
Corresponding Author: Safa Binte Hossain

Abstract: This original research article aims a comprehensive study on the prevalence of different types of cancer in Bangladesh. In addition, the study investigated the usage of different types of chemotherapeutic drugs to treat various types of cancer. The study also categorized the patients based on the cancer stages when they were treated with chemotherapeutic drugs. An observational and retrospective study was conducted on 100 cancer patients attending National Institute of Cancer Research and Hospital and Ahsania Mission Cancer Hospital from July 2017 to November 2017. Patients were differentiated based on the cancer stage and 32 types of cancer were found of 7 different systems of the body. The study categorized the patients based on the cancer stages, 32 types of cancer were found of seven different systems of the body. Most of the patients receiving treatment from the National Institute of Cancer Research and Hospital and Ahsania Mission Cancer Hospital were at stage III. In terms of chemotherapeutic drug of choice, the physicians mostly preferred Cisplatin (n=45) followed by Paclitaxel (n=41), Cyclophosphamide (n=33) and Doxorubicin (n=30).The study indicates that the majority of cancer patients of Bangladesh take treatment at terminal stage of cancer (stage III). Moreover, the study also focused on the chemotherapeutic drug of choice. Therefore, the findings of the study may be useful to compare the efficacy of various chemotherapeutic drugs in the near future.
Keywords: Chemotherapeutic Drugs Frequency, Cancer Stage, Systems of the Body, Breast Cancer, Cisplatin

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I.   Introduction

Cancer is one of major causes of death worldwide [1]. A presumption is that about 13.1 million cancer patients will be prevalent by 2030[2]. It has been assumed by The World Health Organization (WHO) that every year there will be additional 10 million cancer patients, although from 1991 to 2012 a declining trend has been observed. In spite of having progress, death due to liver cancer, pancreatic cancer and uterine cancer are shooting up and at present cancer is considered as one of the most deadly diseases. According to American Cancer Society, in the United States, alone in 2017 new cancer patients numbered 1,688,780 and deaths numbered 600,920 are more likely to occur. In case of all types of cancer the frequency has been observed 20% less in the female than in male. Still, cancer type varies depending on sex[3]. According to European Union every year about 707,000 men and 555,000 women die due to cancer. WHO highlighted that, deaths due to cancer can be prevented minimum 30–40%[1].

Between 1990 and 2010 about 71% boost up in cancer deaths have been observed in the countries that are developing, due to demographic changes alone whereas less than half (31%) increase in the developed countries has been projected[4]. Cancer of the lung, breast, cervix and mouth (oral) are considered as the most common type. In female, cancer of the breast and cervix are the top two occurring cancers and in male population cancer of the lung and mouth (oral) are in top positions[5]. For both cases of men and women the frequency of cancer in the countries that are developing is half of those observed in developed countries although overall cancer mortality are quiet similar[6].

In terms of mortality, cancer is in the 6th position in Bangladesh[7]. Each year in Bangladesh diagnosis of cancer are done for almost 0.2 million new patients and at present there are 1.3-1.5 million existing patients[5]. It has been calculated that for the 130 million people of Bangladesh the approximate figure of cancer load can be 1,200,000, incidence 200,000, prevalence 800,000 and mortality 150,000. In the next 20 to 25 years like other developing countries, cancer is expected to increase two times in Bangladesh[7]. The most cancer deaths each year occur due breast, colorectal, prostate, lung, stomach and liver cancers. However, types vary depending on men and women. The major or prevailing cancers in Bangladesh are lung cancer in men and cervical and breast cancer in women which makes about 38% of all cancers[1].

Chemotherapeutic drugs are most widely used treatment in the majority of cancer patients. This study provides the comparison of the most frequently used chemotherapeutic drugs in Bangladesh and prevalence of cancer patients in various stages of different cancers.

II. Material And Methods

This study was observational and retrospective. As the population was scattered countrywide and hard to find out, the study was a centralized study and conducted within 'Ahsania Mission Cancer Hospital' and the only tertiary care cancer hospital in Bangladesh 'National Institute of Cancer Research and Hospital' from June 2017 to November 2017. These hospitals were selected for data collection as patients all over the country usually come here for the best treatment purpose which actually provided patients from every area of the country.

100 were determined as the sample size randomly. There was no age limit so the population contained patients of varied ages including children. The sample size also included male and female patients.

Inclusion Criteria:
- Patients of either sex.
- Aged ≥ 5 years
- Any geographic area
- Any type of cancer
- Any stage of cancer

Exclusion criteria:
- Pregnant women

In order to collect primary data, in light of the objectives of the study a self-designed questionnaire was used for comparison of widely used chemotherapeutic drugs and incidence of cancer patients in different stages of numerous cancers. Questionnaire and research design were submitted to the ethical committee of the institutions for permission to conduct the study. As it was a retrospective study, patients were chosen carefully so that they had previous record of already started treatment or chemotherapy cycle and results for the analysis of efficacy of treatment. Patients and doctors were asked for gathering information and it was collected individually. In case of children, information was collected from the parents, and the attending physicians.

Measures

In order to inquire the answers of the research objectives and arrange the information various parameters were observed like demographic data, treatment history, patients' injurious habits, patients' food habits, chemotherapeutic drugs prescribed in the hospitals and number of patients in different stages of various cancer. For arrangement and presentation of the collected information in the shape of tables and figures help of the Microsoft Excel 2013 was taken.

III. Result

Cancer Stage and frequency of cancer in relation to varied systems of the body

From the survey the collected information indicated that patients were dispersed in 4 stages of various cancers with the indication of highest number of patients in the stage III regardless of the type of the cancer in Table 1.

**Table1:** Number of patients according to cancer stages

Cancer Stage	Patient Number
IV	24
III	44
II	32
I	0

Table 2: Frequency of cancer in relation to varied systems of the body

| Name of the System	Frequency
Circulatory System	37
Respiratory System	19
Nervous System	1
Musculoskeletal System	4
Digestive System	20
Reproductive System	13
Other Special System/Organ/Gland	6

Human body organs were classified according to numerous systems in the body. The highest number of cancer patients was observed in the special system/organ/gland in Table 2.Every cancer type of a specific organ/system was further classified into 4 stages of that particular cancer.

**Fig.1:** Frequency in Circulatory System relative to varying stages of cancer
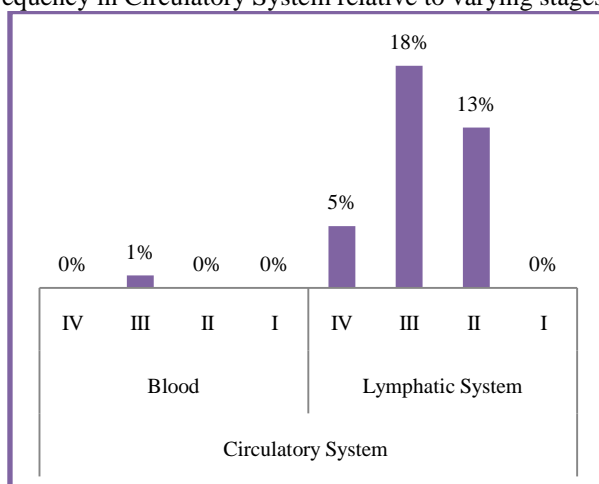
Circulatory System was divided into 2 sections depending on the affected organ/system of the patients in Fig.1**.** From the survey only 1% which is 1 patient, was observed under blood cancer with stage III and in case of lymphatic system cancer 1 patient of stage III Hodgkin's Lymphoma. Under the lymphatic system cancer other 35 patients were suffering from breast cancer. As breast is considered as a part of lymphatic system, breast cancer was categorized under this circulatory system. This (Fig.1) indicates there were 5% or 5 patients in the metastasis condition, 13 patients in the second stage of cancer and 18% or 18stage III cancer patients with 17 breast cancer and 1 Hodgkin's Lymphoma patients.

**Fig.2:** Frequency in Respiratory System relative to varied stages of cancer
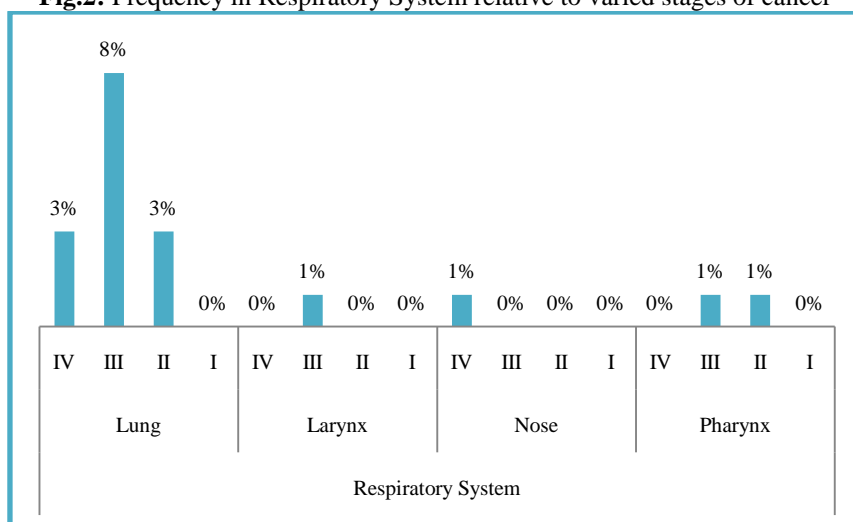
Under the Respiratory System Cancer 18 patients with numerous stages were observed from Fig.2. In the respiratory system 4 types of cancer affected organs/systems were noticed with lung cancer showing 14 patients dispersed in stage II, III and IV. Larynx cancer of stage III was observed in 1 patient. Cancer Diagnosed with Pyriform Fossa was placed under the pharynx with 2 patients of stage II and III and cancer diagnosed of Sinonasal Malignancy was observed under nose classification of Respiratory System with a patient of metastasis.

**Fig. 3:** Frequency depending on different stages of Nervous System cancer
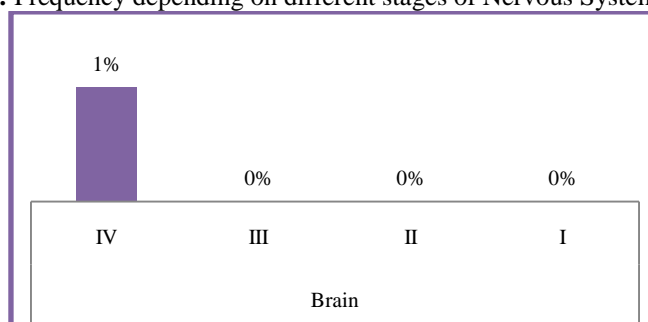
Metastasis of Brain cancer was identified in 1 patient under the Nervous System classification of human body in Fig. 3.

Fig. 4: Frequency based on varied stages of Musculoskeletal System cancer
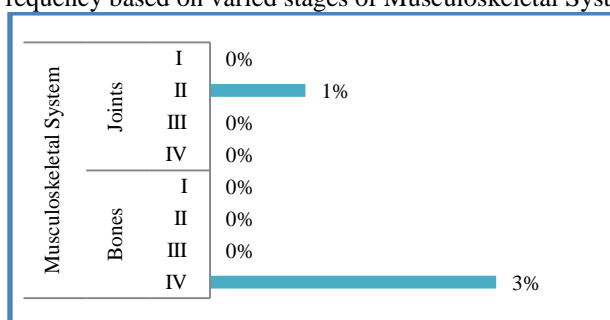

Musculoskeletal System was further differentiated into Bones and Joints according to the availability of cancer patients in this system in Fig. 4. As Ewing's sarcoma initiated in the bone it was placed under the Bone criteria in the System. Ewing's Sarcoma was in the metastasis stage and affected other organs in the body. Soft Tissue Sarcoma initiated in the bone and dispersed into other organs in the body. Synovial Sarcoma initiated in the joint and when diagnosed it was seen stage II cancer as there were tumors and nodes in the affected area.

**Fig. 5:** Frequency supported by different stages of Reproductive System cancer
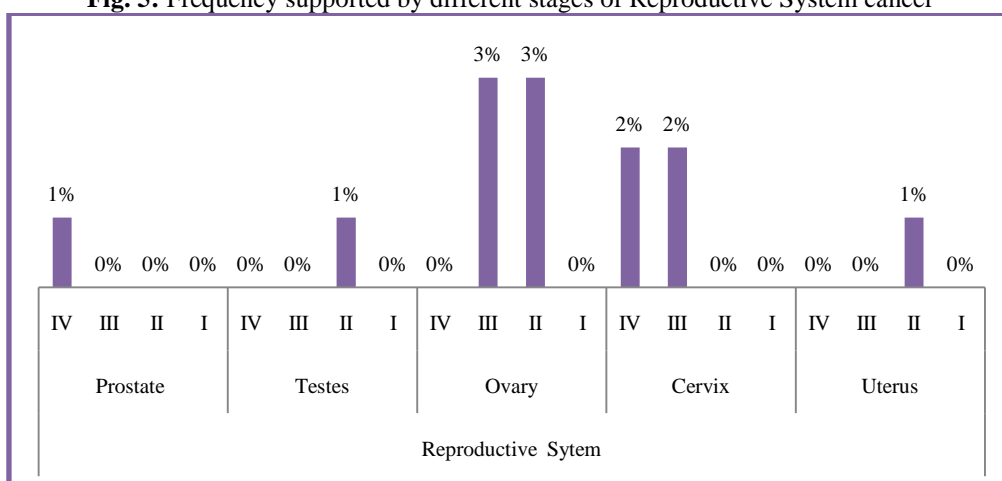
From the sample size of 100 patients of reproductive system cancer were of 13% and 13 in number Fig. 5**.** In this system patients were observed of suffering from cancer of uterus, cervix, ovary, testis and prostate. Collected data presented that most of the patients were suffering from ovary cancer but metastasis condition was observed in 2% patients of cervical cancer and 1 patient of prostate cancer.
20% or a total number of 20 were found suffering from cancer of digestive system with 6 patients having cancer of stage IV (Fig. 6). Digestive system cancer was comprised of cancer of 8 different body parts of human.

Fig. 6: Frequency depending on varying stages of Digestive System cancer
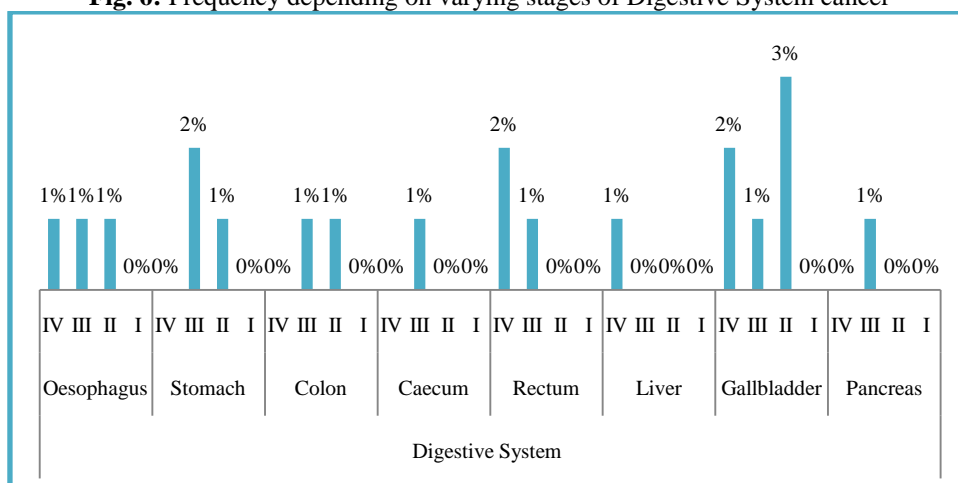
Most of the patients were seen of stage III cancer and there was 0 patients observed in stage I cancer. Some cancers are difficult to set up in any system of the body as they might be a part of two systems of the body or a gland. To ease up the confusion and difficulty all these were collectively placed under the special organ or system or gland.

Fig. 7: Frequency determined by differing stages of Other Special System/Organ/Gland cancer
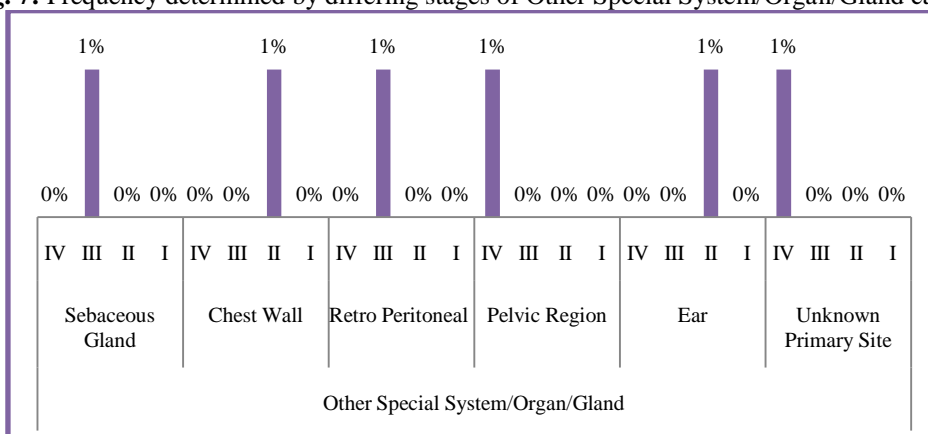
Lowest numbers of patients of the total 100 were observed in this system from Fig. 7. This special system was differentiated into 6 special systems/organs or glands. Cancer of stage III was observed in 2 patients of which 1 was of ear cancer and a patient of primitive neuroectodermal tumor with the chest wall affected as the primary site of cancer. A single patient of unknown primary site was examined with metastasis condition.

Comparison of Chemotherapeutic drugs in Breast, Lung, Ovarian, Gallbladder and Cervical cancer

Fig. 8: Frequency of various chemotherapy drugs in Breast cancer
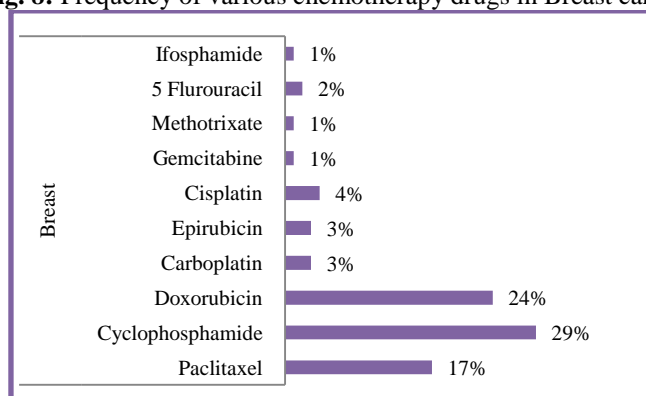
From the sample size of 100 it has been observed that 35 patients had varied stages of breast cancer. Previous treatment history and ongoing treatment strategies of those patients were observed and noted carefully which directed to a list of various chemotherapeutic drugs which were used alone or in combination for the treatment of breast cancer (Fig. 8). From the list, frequency of 10 chemotherapy drugs were presented which were indication of the most popularly prescribed or administered and considered as most effective drugs in breast cancer. Highest frequency of 29% or 29 was observed in Cyclophosphamide with the second higher rate of 24% in Doxorubicin.

**Fig. 9:** Frequency of numerous chemotherapies in Lung cancer
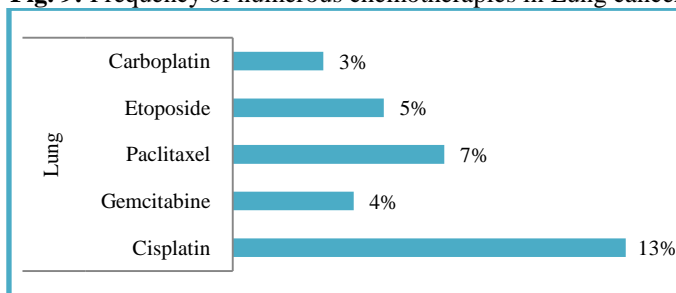
Lung cancer patients were 14 in number. From the previous and ongoing treatment observation it was apparent that 5 drugs were considered most effective and administered accordingly with the highest frequency of 13 in case of Cisplatin (Fig. 9).

**Fig. 10:** Frequency of different chemotherapeutic drugs in Ovary cancer
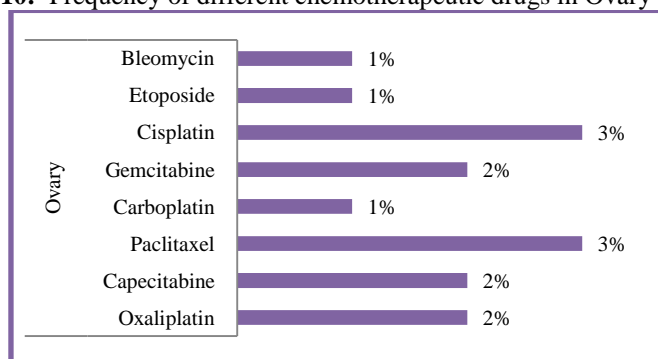
8 types of chemotherapeutic drugs were prescribed and administered in 6 ovarian cancer patients (Fig. 10). It was evident from the Figure that all the drugs had almost same frequency.

Fig. 11: Frequency of variegated chemotherapies in Gallbladder cancer
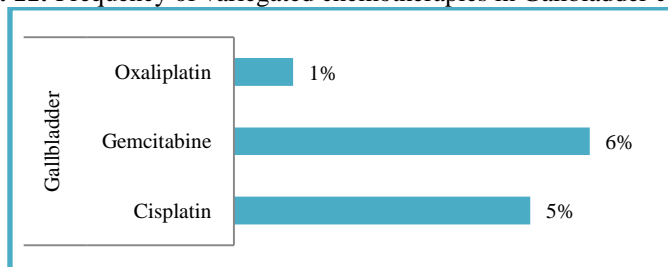
Out of 100 patients only 6 were suffering from various stages of Gallbladder cancer. Physicians prescribed and considered Oxaliplatin, Gemcitabine and Cisplatin as the most effective ones (Fig.11).

**Fig. 12:** Frequency of various chemotherapies in cervical cancer
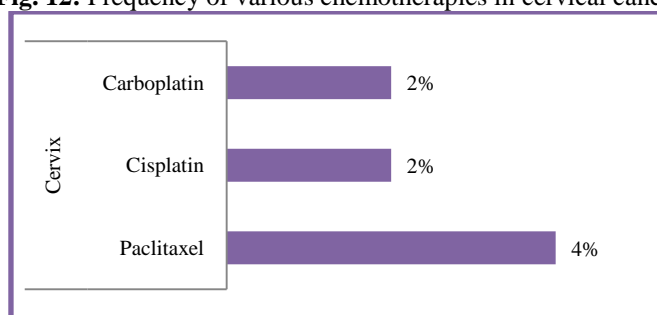
There were 4 cervical cancer patients under treatment with Carboplatin, Cisplatin and Paclitaxel (Fig.12).

Comparison of numerous chemotherapies

About 24 chemotherapy drugs were found prescribed for the100 patients of the sample (Fig.13). These medicines were for 32 types of cancer. Some were used as a single drug and some in combination. Again single drugs were used for several cancers too. Whether used alone or in combination or used for a single cancer or multiple cancers the highest frequency observed was in case of Cisplatin. The frequency was 45. Other high frequency drugs were Paclitaxel, Cyclophosphamide and Doxorubicin.

Fig. 13: Frequencies of Chemotherapy Drugs
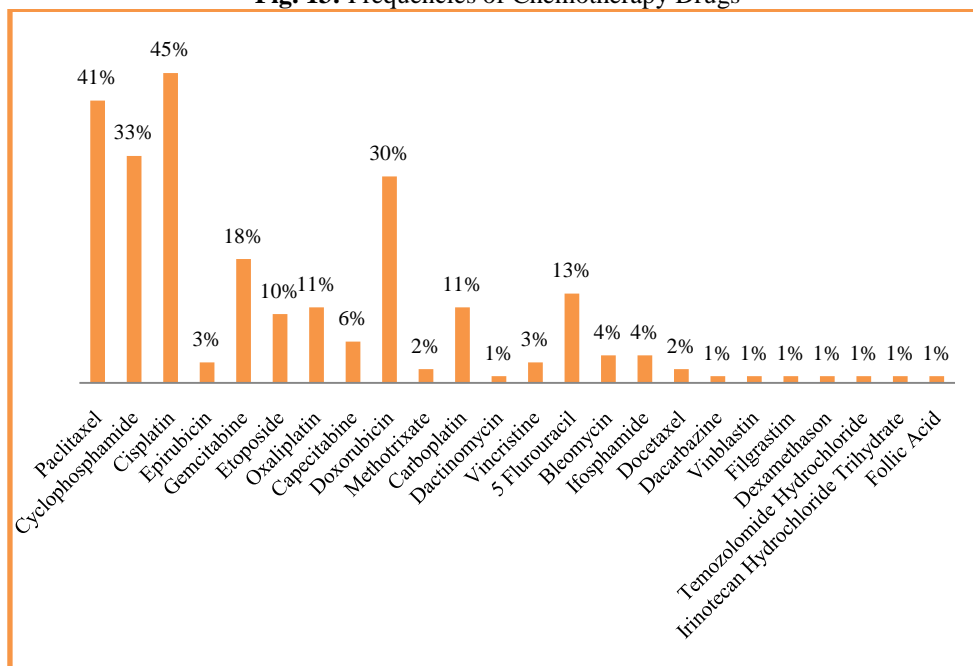
IV. Discussion

Assessment of dispersion of patients according to cancer stages were observed by arranging various cancer patients according to 7 systems of the human body. Every system was further discussed in details by describing affected organs or glands of the system along with the cancer stages. As there were 32 types of cancers observed into the sample size, presentation of the individual data would be hazy.

From the first objective it has been found that the sample size had the highest number of 44 patients in the stage III irrespective of variety of cancers whereas 0 patients were observed in stage I.

In case of highest number of patients in a particular type of cancer, breast cancer presented the highest number of 35 and the second highest number was 14 of lung cancer. Lowest frequency of 1 was found in 22 cancer types. In the second objective 5 cancers having highest frequency among the 100 were considered to observe and determine the frequency of various chemotherapies in those individual cancers. From the observation of breast cancer, lung cancer, ovarian cancer, gallbladder cancer and cervical cancer patients treatment profiles it was evident that physicians preferred Paclitaxel, Cyclophosphamide, Doxorubicin, Cisplatin most compared to other various chemotherapeutic drugs. As these 5 types of cancer constituted more than half of the total sample size of 100, higher frequency level of chemotherapeutic drugs prescribed and administered as

the most effective for respective cancers ultimately affected the frequency of total chemotherapy drugs list. The comparison of the chemotherapy drugs were done based on the frequency of the drugs whether used alone or in combination. Efficacies of the drugs were determined by the treatment history of the patients of the retrospective study which presented the effects of chemotherapy drugs after a number of cycles or after the total chemotherapy cycles were done. The improved health conditions or further deterioration of the health condition or metastasis of the cancer indicated the efficacy of the various chemotherapy drugs.

V. Conclusion

We acknowledge a limitation of the study. As, most of the patients admitted into these hospitals were from indigent financial background, highly expensive medicines were not prescribed rather relatively cost effective same class medicines were prescribed. As a result, the comparison of variegated chemotherapy drugs were done on the available cost effective drugs of the hospitals

Acknowledgement

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