

## Pathological Findings in Patients with Malignant Tumor: Study in the Medical University, Dhaka, Bangladesh

Farhad Mahmud<sup>1\*</sup>, Shahnaz Parvin<sup>2</sup>, Farzana Rahman<sup>3</sup>, Mridul Kumar Saha<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Pathology, Colonel Malek Medical College, Manikganj, Bangladesh

<sup>2</sup>Assistant professor, Department of Pathology, Shaheed Suhrawardy Medical College, Sher E Bangla Nagar, Dhaka, Bangladesh

<sup>3</sup>Assistant Professor, Department of Pathology, National Institute of Traumatology and Orthopedic Rehabilitation, Dhaka, Bangladesh

<sup>4</sup>Assistant Professor(CC), Department of Pathology, Colonel Malek Medical College, Manikganj, Bangladesh

DOI: [10.36347/sjams.2020.v08i06.031](https://doi.org/10.36347/sjams.2020.v08i06.031)

| Received: 02.06.2020 | Accepted: 22.06.2020 | Published: 27.06.2020

\*Corresponding author: Dr. Farhad Mahmud

### Abstract

### Original Research Article

**Introduction:** Cancer is a major health challenge all over the world. It has devastating effect on individual, family and society. The number of cancer deaths worldwide has been considered to be about 4 million each year. An estimated 12.66 million people were diagnosed with cancer across the world in 2008, and 7.56 million people died from the disease. During the past century, cancer has emerged as the most challenging problems for public health systems in medium- and low-resource countries. **Aim of the study:** To assess the pathological findings of the patients with malignant tumor. **Material & Methods:** This is a cross sectional study conducted at the Department of Pathology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh from October 2011 to September 2012. All tumor cases diagnosed by histopathology or cytopathology in the department of Pathology, BSMMU were enrolled in this study. The materials for diagnoses were biopsy specimens, surgical resection/excised specimens, and cytology specimens. All tumor reports were stored in computer data base and would be retrieved according to need. Information was collected from the patients or close relatives of the patients. Personal identification data and tumor related information including ICD-O3 and ICD 10 were collected and recorded systematically in a data abstraction sheet. Tumor identification part was filled up by a resident doctor. All precautions were maintained to avoid multiple counts of same patient. These data were entered in to software by using Microsoft access. Basic frequency distribution and proportion of data were presented in tables, figures and diagrams. Statistical analyses of the results will be obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-15). **Results:** Among 3657 cases, 2559 were malignant (69.98%), 1098 (30.02%) were benign. Among malignant tumors, 11 (0.43%) cases were of low malignant potential, 17 (0.66%) were borderline malignancy, 28 (1.09%) cases included carcinoma in-situ or intraepithelial/noninvasive malignancy, 58 (2.27%) were uncertain whether benign or malignant, 2034 (79.48%) cases were primary malignant tumors and 404 (15.79%) were secondary malignant tumors. Of the total cases, 1549 (42.36%) were male and 2108 (57.64%) were female. The male: female ratio was 1: 1.36. The age range was from 2 to 85 years mean  $47.30 \pm 16.37$  with a range of 2 – 85 years. Sarcoma 16 (26.66%) was the most frequent malignant tumor in pediatrics age group followed by nephroblastoma 8 (13.33%). neuroblastoma 5 (8.33%). 1482 (38%) biopsy cases, 857 (24.3%) resected specimens, 1281 (36.0%) FNAC cases, 34 (1.0%) cytology samples of body fluid cases and 3 (0.1%) Scrapping /brushing cases. In male, oral cavity and oropharynx cancer top the list 159 (18%), followed by the stomach 83 (10%), liver 63 (7.0%), colon and rectum 59 (7%) urinary bladder 56 (6.0%), thyroid 57 (7.0%), lymph node 21 (2%), kidney 33 (4.0%), peri-ampullary carcinoma 45 (5.0%) and oesophagus 19 (2%). In females the cervical cancers had the highest frequency 253 (22%), followed by the breast 224 (19%), thyroid 157 (13.0%), oral cavity and oropharynx 156 (13%), colon and rectum 58 (5%), stomach 43 (4%), gallbladder 26 (2%), ampullary region 22 (2%), urinary bladder 16 (01%), oesophagus 16 (01%). **Conclusion:** Bangladesh is still lacking an effective national cancer registry. With a cancer load of more than one million, a cancer registry is an urgent need.

**Keywords:** Pathological Findings, Malignant, Tumor, Histopathology, Cytopathology.

**Copyright @ 2020:** This is an open-access article distributed under the terms of the Creative Commons Attribution license which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use (NonCommercial, or CC-BY-NC) provided the original author and source are credited.

## INTRODUCTION

Cancer is a major health challenge all over the world. It has devastating effect on individual, family

and society. The number of cancer deaths worldwide has been considered to be about 4 million each year. An estimated 12.66 million people were diagnosed with cancer across the world in 2008, and 7.56 million

people died from the disease. During the past century, cancer has emerged as the most challenging problems for public health systems in medium- and low-resource countries. At present, half of the new cancer cases in the world occur in the developing countries. Bangladesh is not spared from this problem. According to Bangladesh Bureau of Statistics cancer is the sixth leading cause of death in Bangladesh (BBS, 2008). One of the first steps in controlling the cancer burden is to collect information about the incidence, type, location of cancer etc. This is best done through “Cancer Registry [1]”. To control cancer proper recording of data on cancer is essential. Data such as death certificates and hospital statistics are not sufficient alone for the analysis of the cancer incidences and monitoring of the patterns. The synonym ‘tumor registry’ is often used particularly in the United States of America [2]. This term appears more appropriate, because most cancer registries include the registration of a number of benign and malignant tumors. Moreover, ICD code which is used in cancer registry also includes benign tumors. Bangladesh has not yet initiated a national population based cancer registry. Cancer load is more than 1,200,000 in Bangladesh. According to Bangladesh Bureau of Statistics cancer is the sixth leading cause of death in Bangladesh (BBS, 2008). Each year more than 200,000 people develop cancer and 150,000 die of the disease. IARC estimated death from cancer in Bangladesh was 7.5 % in 2005 and will be increased up to 13 % in 2030. Maintenance of a file or register of all cancer cases in a defined population is called cancer registry. The other name commonly used is tumor registry. Tumor registries are systems for collection, storage, analysis and interpretation of data from people with cancer [3]. It involves recording of personal particulars of cancer patients and the clinical and pathological characteristics of the cancers, collected continuously and systematically from various data sources [2]. To control cancer proper data on cancer trend is essential. Cancer registry is the tool which can provide such information. One of the critical steps in controlling the cancer burden is to collect information about the incidence, type, and location of cancers. This is best done within the framework of cancer registries [4]. Main target of a cancer registry is to record information from all cancer cases to produce statistics on the cancer prevalence in a given population. Cancer registry in developing countries often starts on the basis of cases attending hospitals, or of cases of cancer diagnosed in a department of histopathology. The number of people developing cancer is expected to increase in number mainly because of ageing population, lifestyle factors and access to health facilities. A population-based cancer registry is usually easier to achieve in smaller countries with good infrastructure. Though it is ideal, may not be practicable in developing countries due to restrictions of finances and a lack of technical expertise. Therefore, most developing countries lack a well-organized cancer control program largely due to a deficiency of incidence

data. Pathology-based cancer data is a high quality reflection of the patterns of cancer in the population it represents, provided the demographic details of the patients are carefully recorded. A good quality, large-scale pathology data with demographic details of the patient can give coverage to the population [3]. As integral part of tumor reporting, all the pathology centers keep some basic information in Bangladesh. For a successful hospital based tumor registry a well-equipped medical record department with skilled manpower record system is needed. This infrastructure is poorly developed in most of the hospitals, so hospital-based tumor registry is difficult to implement at present.

## METHODOLOGY AND MATERIALS

This is a cross sectional study conducted at the Department of Pathology, Bangabandhu Sheikh Mujib Medical University, Dhaka from October 2011 to September 2012. The study had two parts: 1. Establishment of pathology based tumor registry (PBTR) at BSMMU; 2. Analysis of data gathered during the study period. All tumor cases diagnosed by histopathology or cytopathology in the department of Pathology, BSMMU were enrolled in this study. About 12,000 histopathology specimens are received each year. Similarly, many patients come for cytopathology. It is therefore a very suitable place to start a pathology based tumor registry. With this aim, pathology department started planning a registry. The BSMMU administrative authority encouraged the move. The materials for diagnoses were biopsy specimens, surgical resection/excised specimens, and cytology specimens. The adult and paediatrics haematology departments of BSMMU are under separate administration and pulmonology is in its developing phase. Therefore, hematological malignancy and lung cancer cases were not included at this phase. Suspicious cases of tumor cases of tumor not diagnosed by histopathology or cytopathology were also not included. All tumor reports were stored in computer data base and would be retrieved according to need. Information was collected from the patients or close relatives of the patients. They were explained about tumor registry and a verbal consent was taken from the patient/ patient’s guardian to be included in the study. Personal identification data and tumor related information including ICD-O3 and ICD 10 were collected and recorded systematically in a data abstraction sheet. Tumor identification part was filled up by a resident doctor. All precautions were maintained to avoid multiple counts of same patient. Data collected methodically and meticulously from October 2011 to September 2012 as far as questionnaire. These data were entered in to software by using Microsoft access. With the help of this software a master database was developed. Then data were categorized according to age group, gender, anatomical sites, benign or malignant tumor, occupation, risk behavior, socioeconomic condition and tumor identification. Sub set of data such as religion,

geographical subdivision, rural and urban areas, etc were categorized. Basic frequency distribution and proportion of data were presented in tables, figures and diagrams. Statistical analyses of the results will be obtained by using window based computer software devised with Statistical Packages for Social Sciences (SPSS-15).

## RESULTS

Among 3657 cases, 2559 were malignant (69.98%), 1098 (30.02%) were benign. Among malignant tumors, 11 (0.43%) cases were of low malignant potential, 17 (0.66%) were borderline malignancy, 28 (1.09%) cases included carcinoma in-situ or intraepithelial/noninvasive malignancy, 58 (2.27%) were uncertain whether benign or malignant, 2034 (79.48%) cases were primary malignant tumors and 404 (15.79%) were secondary malignant tumors (Table I). Of the total cases, 1549 (42.36%) were male and 2108 (57.64%) were female. The male: female ratio was 1: 1.36. In 2034 malignant tumor cases, were divided into age group decades. The age range was from 2 to 85 years. Considering each decade, fifth decade contained highest number of cases followed by sixth and fourth decade. The age range was from 2 to 85 years mean  $47.30 \pm 16.37$  with a range of 2 – 85 years. Where the cases were divided into pediatric group ( $\leq 15$  years) and adult group ( $>15$  years) among 2034 cancer patients, 1974 (97.05%) patients were in adult group, 60 (2.85%) in the pediatric group. Table 4.2.2 showed Sarcoma 16 (26.66%) was the most frequent malignant tumor in pediatrics age group followed by nephroblastoma 8 (13.33%). neuroblastoma 5 (8.33%). Distribution according to nature of procedure shows, 1482 (38%) biopsy cases, 857 (24.3%) resected specimens, 1281 (36.0%) FNAC cases, 34 (1.0%) cytology samples of body fluid cases and 3 (0.1%) Scrapping / brushing cases (Table IV). Oral cavity and

oropharynx represented the highest number of cases i.e. 315 (15.49%), followed by cervix 253 (12.44%) breast 224 (11.01%), thyroid 214 (10.52%), stomach 126 (6.19%), colon and rectum 117 (5.75%), Liver 77(3.79%), Urinary bladder 72 (3.54%), Ampulla region 67 (3.29%) and Kidney 48 (2.36%) (Table V). Ranking of Male Malignant Tumors shown in Table VI describes, in male, oral cavity and oropharynx cancer top the list 159 (18%), followed by the stomach 83 (10%), liver 63 (7.0%), colon and rectum 59 (7%) urinary bladder 56 (6.0%), thyroid 57 (7.0%), lymph node 21 (2%), kidney 33 (4.0%), peri-ampullary carcinoma 45 (5.0%) and oesophagus 19 (2%). Table VII showed ranking of female malignancies in different sites. In females the cervical cancers had the highest frequency 253 (22%), followed by the breast 224 (19%), thyroid 157 (13.0 %), oral cavity and oropharynx 156 (13%), colon and rectum 58 (5%), stomach 43 (4%), gallbladder 26 (2%), ampullary region 22 (2%), urinary bladder 16 (01%), oesophagus 16 (01%). Table VIII shows histopathological diagnosis of malignant tumor patients. Among 2034 malignant cases, diagnosis is squamous cell carcinoma in 722 (35.49%) cases, adenocarcinoma in 360 (17.70%) cases, ductal carcinoma of breast in 222 (10.91%) cases, papillary carcinoma of thyroid in 189 (9.29 %) cases, hepatocellular carcinoma 67 (3.29%) cases, urothelial carcinoma 61 (03%) cases, lymphoma 32 (1.57%) cases. Table IX showed frequency of different sites of malignant tumors in oral cavity. Buccal mucosa represents the highest figure 99 (31.42%) followed by tongue 56 (17.77%), cheek 30 (9.52%), and palate 27 (8.57%), tonsillar region 24 (7.61%) and alveolar region 23 (7.30%). Among 1098 benign tumors, lipoma ranked the first 392 (35.70%) followed by fibroadenoma 276 (25.16%), pleomorphic adenoma 89 (8.10%), leiomyoma 53(4.82%) and schwannoma 48(4.37%).

**Table-I: Distribution of patients according to tumor behavior**

Tumor behavior	Frequency	Percentage
Benign	1098	30.02
Malignant	2559	69.98
Uncertain whether benign or malignant	58	1.58
Borderline malignancy	17	0.47
Low malignant potential	11	0.30
Carcinoma in-situ	28	0.76
Malignant, primary site	2034	55.62
Malignant, secondary site	404	11.05
<b>Total</b>	<b>3657</b>	<b>100.0</b>

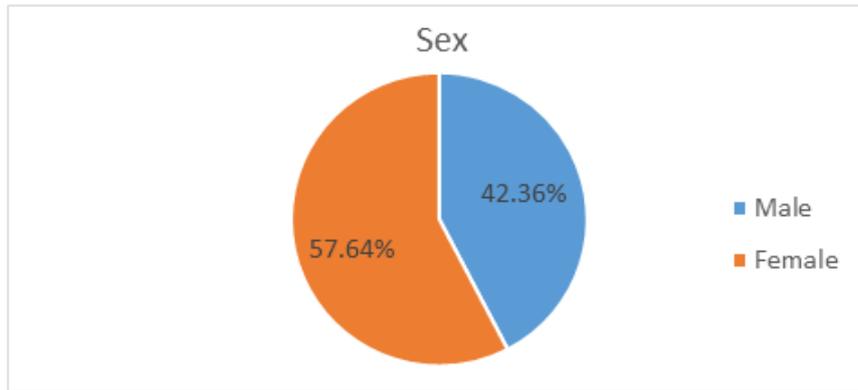


Fig-I: Sex distribution of patients

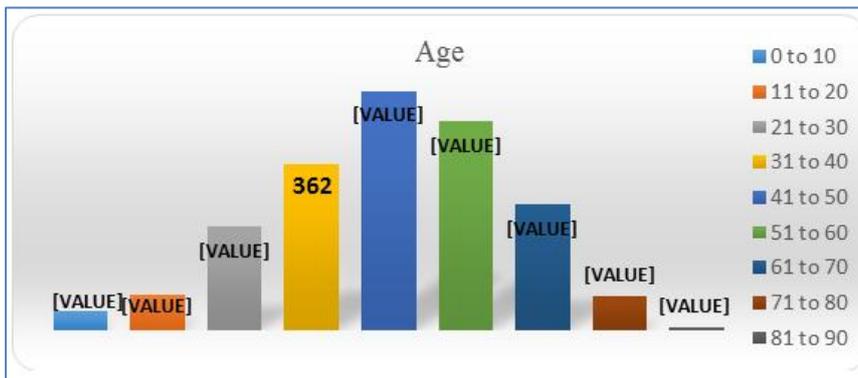


Fig-II: Age distribution of malignant tumor patients

Table-II: Distribution of malignant tumor according to age group

Age group	Frequency	Percentage
Pediatric <15	60	2.95
Adult 15>	1974	97.05
<b>Total</b>	<b>2034</b>	<b>100.00</b>

Table-III: Ranking of paediatric (<15 years) malignant tumors

Site	Frequency	Percentage
Sarcoma	16	26.66
Nephroblastoma	08	13.33
Neuroblastoma	05	8.33
Papillary carcinoma of thyroid	05	8.33
Hepatoblastoma	04	6.66
Medulloblastoma	04	6.66
Non Hodgkin lymphoma	04	6.66
Others	14	23.33
<b>Total</b>	<b>60</b>	<b>100.0</b>

Table IV: Distribution according to nature of procedure

	Procedure	Frequency	Percentage
Histopathology	Biopsy	1482	38.0
	Resection	857	24.3
Cytopathology	FNAC	1281	36
	Cytology of body fluid	34	1.0
	Scrapping / Brushing	3	0.1
<b>Total</b>		<b>3657</b>	<b>100.0</b>

**Table-V: Distribution of malignant tumors according to site**

Site	Frequency	Percentage
Oral cavity and oropharynx	315	15.49
Cervix	253	12.44
Breast	224	11.01
Thyroid	214	10.52
Stomach	126	6.19
Colon and Rectum	117	5.75
Liver	77	3.79
Urinary bladder	72	3.54
Ampullary region	67	3.29
Kidney	48	2.36
Others	521	25.61
Total	2034	100.00

**Table-VI: Ranking of Male Malignant Tumors**

Site	Frequency	Percentage
Oral cavity and oropharynx	159	18
Stomach	83	10
Liver	63	7
Colon and Rectum	59	7
Thyroid	57	7
Urinary bladder	56	6
Ampulla region	45	5
Kidney	33	4
Lymph node	21	2
Oesophagus	19	2
Others	274	32
Total	869	100.00

**Table-VII: Ranking of Female Malignant Tumors**

Site	Frequency	Percentage
Cervix	253	22
Breast	224	19
Thyroid	157	13
Oral cavity and oropharynx	156	13
Colon and Rectum	58	5
Stomach	43	4
Gallbladder	26	2
Ampullary region	22	2
Urinary bladder	16	1
Oesophagus	16	1
others	194	17
Total	1165	100

**Table-VIII: Distribution of malignant tumor according to diagnosis**

Diagnosis	Frequency	Percentage
Squamous cell carcinoma	722	35.49
Adenocarcinoma	360	17.70
Duct cell carcinoma	222	10.91
Papillary carcinoma	189	9.29
Hepatocellular carcinoma	67	3.29
Urothelial transitional cell carcinoma	61	3.00
Lymphoma	32	1.57
Other	381	18.73
Total	2034	100.00

**Table-IX: Distribution of malignant tumor in different site of oral cavity**

Site	Frequency	Percentage
Buccal mucosa	99	31.42
Tongue	56	17.77
Cheek	30	9.52
Palate	27	8.57
Tonsillar region	24	7.61
Alveolar region	23	7.30
Pyramiform fossa	19	6.03
Base of the tongue	12	3.80
Posterior pharyngeal wall	11	3.49
Vestibular area	7	2.22
Retro molar area	7	2.22
<b>Total</b>	<b>315</b>	<b>100.0</b>

**Table-X: Distribution of benign tumor**

Benign tumor	Frequency	Percentage
Lipoma	392	35.70
Fibroadenoma	276	25.13
Pleomorphic adenoma	89	8.10
Leiomyoma	53	4.82
Haemangioma	51	4.64
Schwannoma	48	4.37
Meningioma	33	3.00
Neurofibroma	17	1.54
Other	139	12.65
<b>Total</b>	<b>1098</b>	<b>100</b>

## DISCUSSION

The first part of the pilot project was to establish a pathology based tumor registry at BSMMU hence to assess and define the problems and pitfalls encountered during establishing the registry. With collaboration from the University of Chicago under the existing memorandum of understanding with BSMMU, a pathology based tumor registry started at the Department of Pathology, BSMMU in October 2011. A well-equipped room within the Pathology department had been allocated for this purpose and named "Tumor Registry Cell" which was officially inaugurated by the Vice Chancellor of BSMMU. A valid and reliable questionnaire and software for data entry were developed with the help of the University of Chicago, USA. MacLennan [2] method of questionnaire was followed. It has two parts. The first part is a questionnaire designed to record the demographic details of a tumor bearing patient including name, identification particulars, risk behaviors, socioeconomic status, occupation, family history of cancer etc. The second part is to record the pathological diagnosis of tumor including its topography, mode of diagnosis, type and grade of tumor with its ICD-O code etc. A Bengali version of the questionnaire was also developed for better understanding of the responders. The information collected was entered into the database by software Microsoft Access 2003 and Visual Basic 6. Some

difficulties had been faced during setting up of the tumor registry. Preparation of the questionnaire and development of software for database were difficult task and needed expertise which was provided by the University of Chicago Research Bangladesh, a Dhaka-based research center affiliated with the University of Chicago, USA. As there was no trained staff to work for the registry, the investigator himself had to collect the data including demographic details from the patients or their attendants. Some of the patients were unenthusiastic to fill up the questionnaire while some were illiterate. The investigator had to motivate them to fill up the questionnaire or when illiterate, had to fill up the form himself by interviewing the questions one by one. The data were mainly based on histopathology or cytopathology diagnosis of tumors excluding lung and hematological malignancies. Because the latter cases were diagnosed in the department of hematology, so only a few trephine biopsy samples of bone marrow were available. The thoracic surgery and respiratory medicine departments started a few years ago and had only few cases. For this reason, lung samples were scarce. The study included only the cases of tumors that were diagnosed in the department of pathology, BSMMU from October 2011, to September, 2012. A total of 3657 tumor cases, including both benign and malignant tumors, could be enrolled for the final analysis. Data were analyzed in two groups based on complete and partly incomplete information. The first one was data collected from 3657 tumor cases contained both complete and incomplete data and the second one was 1135 tumor cases contained only complete data. Data from 2522 cases were partly incomplete due to failure to communicate with the tumor bearing patients. The information taken were age, sex, religion, marital status, area, occupation, socioeconomic condition, risk behavior, family history, co morbidity, site, morphologic diagnosis, grade, stage, primary or metastatic. The distribution of benign and malignant tumors in the study showed predominance of malignant tumors constituting a majority of 69.98%. The reasons may be as follows: i) some of the benign tumors were not sent for histopathological examination; ii) as BSMMU is a tertiary care hospital, it receives mostly the difficult cases and also the referred cases from various regions of the country. The age range of the patients was from 2 to 85 years with a mean age of  $47.30 \pm 16.37$  years. According to IARC, the median age for individual countries ranges from around 45 years (for example, in Japan and Germany). The National Cancer Control Strategy and Plan of Action for 2009-2015 of Bangladesh have stated that more than 66% of the cancers occur in the age group of 30-65 years. Talukder *et al.* [5] showed that peak incidence of malignant tumors was more common in the fourth decade. The present study showed that the frequency of malignant tumor was more from fourth decade to sixth decade. Frequency of the pediatric tumors was 2.85%. The National Cancer Control Strategy and Plan of Action for 2009-2015 of Bangladesh stated that children

with cancer represented 1 percent of the overall incidence of the disease. NICRH found that in children aged 14 years or younger, lymphoma, retinoblastoma, osteosarcoma, leukemia and kidney tumors were most commonly found. Korir and Mutuma<sup>6</sup> showed that retinoblastoma had the highest frequency. In this study, sarcoma was the most common tumor in pediatric age group followed by nephroblastoma.

Male to female ratio in the study population was 1: 1.36. Similar findings were found by some studies [5-7]. But IARC and cancer research, UK 2009 jointly showed that only four cancer sites – lung (13%), female breast (11%), colorectum (10%) and stomach (08%) accounted for two-fifths (41%) of the world's total. Lung cancer has been estimated as the most common cancer in the world for several decades. An estimated 1.61 million people across the world were diagnosed with lung cancer in 2008, accounting for 13% of the total, more than half (55%) of the cases occurred in the developing world. In the present study, oral cavity and oropharynx cancers represented the highest frequency (15.49%) followed by cervix (12.44%), breast (11.01%), thyroid (10.52%), stomach (6.19%), colorectal (5.75%), liver (3.79%) Lung specimen is not available at this institution, because thoracic surgery department is in its preliminary stage.

## LIMITATIONS OF THE STUDY

Like any other scientific studies this study has some limitations which needs to clarify. Firstly, Hematological malignancy is not included in this study. Because it is a separate department. Therefore, a percentage of malignant cases are excluded. Secondly, due to unavailability of lung specimen, a major cancer of male patients in Bangladesh could not be included in this study. And finally, in large number of cases, complete data could not be recorded because of lack of awareness within the population, limited manpower and lack of experience.

## CONCLUSION AND RECOMMENDATIONS

Bangladesh is still lacking an effective national cancer registry. With a cancer load of more than one million, a cancer registry is an urgent need. Establishment of cancer registry faces certain challenges, such as, deficiency of basic health services, lack of demographic data, lack of trained staff, lack of patient monitoring, lack of devices and tools, financial problems and failure to achieve institutionalization. Despite all these constraints, the aim will be, to develop a hospital- or pathology-based registry at least in the beginning, though a National Population based cancer registry should be the ultimate goal. Through this

research project a pathology based cancer registry cell will be established at BSMMU. It will be supported by technical help from the Department of Health Studies (Epidemiology), Medicine and Human Genetics, University of Chicago through the existing Memorandum of Understanding. The tumor registry will be continued phase wise. The experience gained during this will help expansion of cancer registry with phase wise incorporation of other institutes throughout the country. Data generated from this cancer registry will then help formulation of strategies to prevent and control cancer in Bangladesh.

## REFERENCES

1. Etemadi A, Alireza S, Shahryar S, Seyed MN, Hooman K and Moslem B. Cancer Registry in Iran: A Brief Overview. Arch Iranian Med.2008; 11(5): 577-580.
2. Jensen OM and Whelan S. Planning a Cancer Registry, in Jensen OM Parkin DM, MacLennan R, Muir CS, and Skeet RG (eds). Cancer Registration: Principle and Method Lyon: IARC publ; 1991.
3. Bhurgri Y, Hasan SH, Pervez S, Kayani N, Hussainy AS, Muzaffar S and Khurshid M. Large-scale pathology-based cancer data a reflection of population-based cancer data. Pathol Oncol Res.2002; 8: 62-7.
4. Parkin DM. The evolution of the population-based cancer registry. Nat Rev Cancer.2006; 6:603-12.
5. Talukder SI, Das RK, Chowdhury SA, Rahman MT, Begum J, Nahar M. and Ali, MY. Histopathology Based Disease Patterns in Dinajpur. Dinajpur Med Col J. 2009; 2: 13-16.
6. Mutuma G, Korir A Cancer Registry Report (2000-2002), Nairobi, 2006. Available at <https://www.healthresearchweb.org/files/CancerIncidenceReportKEMRI.pdf>
7. Mokhtar N and Adel I. Cancer Pathology Registry 2003-2004 and Time Trend Analysis. Department of Pathology, National Cancer Institute, University of Cairo; 2007.
8. Cancer World. Retrieved February 14, 2013, from [http://publications.cancerresearchuk.org\\_1-8](http://publications.cancerresearchuk.org_1-8)
9. Cancer in Queensland: Incidence, Mortality, Survival and Prevalence 1982 to 2008. Statistical Tables Queensland Cancer Registry Cancer Council Queensland. © The State of Queensland, Queensland Health. 2011; 4-58
10. Cancer Epidemiology in South Asia - Past, Present and Future. Asian Pacific Journal of Cancer Prevention; 10 (Asian Epidemiology Supplement). 2011: 49-67.