Trends and distributions of common types of cancer in Bangladesh: Results from the cancer registry data of 2008-10

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Abstract
Inadequate knowledge about health, illiteracy, cultural and religious issues, poverty, chronic infection, and malnutrition are continuously adding additional threat on the huge burden of cancers in Bangladesh. The aim of this study was to determine the trends and distributions of cancers in Bangladesh. Retrospective analysis was done on the cancer patients registered in the National Institute of Cancer Research and Hospital (NICRH) in Dhaka, Bangladesh during January, 2008 to December, 2010. Of total 27,281 cancer patients, 56.2% were male and majority were from 45-54 years age group. There was an increasing trend of cancers during the study period (P <0.05). According to International Classification of Diseases for Oncology (ICD-O, 3rd edition), most frequent cancers were respiratory system and intrathoracic organs (23.1%) followed by digestive organs (18.5%), female genital organs (11.9%), breast (11.7%), and lip, oral cavity and pharynx (11.6%). Overall, lung cancer was the leading cancer followed by breast, cervical, lymph node and lymphatics, and esophageal cancer. Lung cancer was the leading cancer among male followed by lymph node and lymphatics, and esophagus. However, top of the list was occupied by the breast cancer among females followed by cervical cancer, and lung cancer. In conclusion, an increasing trend of cancer was observed in Bangladesh. Lung and breast cancer was the leading cancer in male and female, respectively; and most frequent cancer was observed among illiterate and middle aged population. We recommend exerting proper emphasis on anti-tobacco campaign and breast self-examination for the females in addition to increasing overall awareness against cancers in Bangladesh.

Key Words: Common cancers, distributions, cancer registry, Bangladesh

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cases occur in the SEAR. The most common sites of cancers among males are the lung (17%), followed by mouth and oropharynx (15%), and liver (7.5%). Among women, cervical and breast cancers are the most common, accounting for 35% of all cancer deaths. The majority of cancer cases present at an advanced stage of the disease and with complications, which imposes a heavy burden on the family and the health-care system.

Cancer is one of the major causes of morbidity and mortality, and it is sixth leading causes of mortality in Bangladesh. It is estimated that projected figure of cancer load, incidence, prevalence and mortality can be estimated approximately as 1,200,000; 200,000; 800,000 and 150,000 respectively for the 130 million people of Bangladesh. Cancer is expected to be double in Bangladesh like other developing countries in the next 20 to 25 years. According to WHO, at least 30% of these cancers are preventable. Despite these alarming speculations and availability of abundant predisposing factors like, higher rate of tobacco use, environmental pollution, and irrational use of chemicals, increased illiteracy, malnutrition, and poverty, there is no reliable statistical data about trends of cancer and its distributions in Bangladesh.

This study was aimed to determine the trends of cancers in Bangladesh and to explore distributions of common types of cancer based on the data available in the ‘Cancer Registry’ at National Institute of Cancer Research and Hospital (NICRH), Dhaka, Bangladesh.

Materials and methods

Retrospective study was done on 27,281 cancer patients registered in the ‘Cancer Registry’ of NICRH, Dhaka during January 2008 to 2010. This is the ever first cancer registry established in Dhaka, Bangladesh. A checklist was developed and used to extract relevant information from the cancer registry.

Flow of patients at NICRH

After initial registration, patient identification, socio-demographic characteristics and history of tobacco uses were noted at cancer register interview room. Method of diagnosis, clinical stages and details of treatment were obtained from the diagnosed and referred cases. After completing this session each patient was directed to the medical officers of respective departments. The medical officer then took a brief clinical history and conducted appropriate physical examination. Attending doctors reviewed all the relevant documents of the concern disease and used to give new investigations if needed. Patients along with all investigation reports were then sent to chief medical officer, who placed the patients before the Tumor Board. Tumor Board was consisted of experienced professors, associate and assistant professors of various sub-specialties. They then decided on the final diagnosis and treatment modalities.

ICD-O coding

In the next step, an experienced coder coded the cancer on the basis of International Classification of Disease and Related Health Problems, 10th Revision, ICD-O (3rd edition). Data for this were extracted for all relevant records of the hospital like inpatient registry, Tumor Board Record, etc. In the registry form the most valid basis of diagnosis was recorded. Data management and other operational works were done by cancer epidemiology department of NICRH.

During data analysis and reporting, a strict procedure was applied to maintain confidentiality of the information of the patients. A prior permission was obtained from all the patients during registration consenting for use of their information for subsequent analysis and use without recognizing their identity.

Statistical analysis

Statistical analyses were performed with the Statistical Package for the Social Science, version 19.0 (SPSS, Chicago, IL, USA). Descriptive statistics were applied. Chi-square test for trend was used to see the trend of cancers over years. Student’s t test for continuous variables and the chi square test for categorical variables were used in the assessment of differences between the two groups when appropriate. All the statistical tests were two-tailed and P values <0.05 were considered as statistically significant.

Results

There were an estimated 27,281 cancer patients attending at NICRH during the year 2008 to 2010. Out of these total, 15,333 (56.2%) were male and majority were married. Illiterate patients were suffering from cancer more than literate for both sexes (20.5% for male and 19.0% for female). Two-fifth of them were housewives and one-fifth of the respondents were agriculturist by profession (Table 1). Fig. 1 describes age wise distribution of different types of cancers. Majority (25.4%) were at the age group 45-54 years followed by 21.8% and 19.0% for female. Two-fifth of them were housewives and one-fifth of the respondents were agriculturist by profession (Table 1). Fig. 1 describes age wise distribution of different types of cancers. Majority (25.4%) were at the age group 45-54 years followed by 21.8% and 16.6% at the age group 55-64 years and 35-44 years, respectively.

Table 2 showed different types of cancer based on ICD-O-3rd. We found majority, 6304 (23.1%) of the cancer involving respiratory system and intra thoracic organs followed by digestive organs, 5048 (18.5%) and female genital organs, 3255 (11.9%). Breast cancer was steadily increasing during the past three years. The figure on 2008, 2009 and 2010 was 759 (10.2%), 1196 (12.3%) and 1242 (12.3%), respectively. We found a significant upward trend of over cancer rate during 2008-2010 (P for
Lung cancer 4915 (17.9%), breast cancer 3185 (11.5%), cervix cancer 2532 (9.2%), lymphnode and lymphatics cancer 1948 (7.0%), oesophagus cancer 1437 (5.5%), and stomach cancer 1193 (4.6%) were the top six cancer throughout the three years. Top 10 cancers in Bangladesh were shown in Table 3.

Based on gender, we found the leading cancer among male were lung cancer 3641 (23.8%), followed by lymphatics 1254 (8.2%), oesophagus 903 (5.9%), larynx 811 (5.3%) and stomach 765 (5.0%). The top five cancer among female were breast cancer 3160 (26.4%), followed by cervical cancer 2532 (21.1%), lung cancer 587 (4.9%), lymphnode and lymphatics cancer 515 (4.3%), and oral cavity cancer 455 (3.8%). Top 10 cancers based on gender depicted in Fig. 2.

Fig. 3 showed the distribution of cancers in different districts. Highest number of cancer patients were in Dhaka district 2691 (9.9%) followed by Comilla 1777 (6.5%), Gazipur 1225 (4.5%), Tangail 1150 (4.2%), and Chandpur 1067 (3.9%).

| Variables | 2008 | 2009 | 2010 | 2008-2010 |
|-----------|------|------|------|-----------|
| Religion  |      |      |      |           |
| Islam     | 3987 (53.4) | 2984 (40.0) | 5026 (51.5) | 4099 (42.0) |
| Hinduism  | 262 (3.5)  | 209 (2.8)   | 324 (3.3)   | 277 (2.8)   |
| Christianity | 7 (0.1) | 6 (0.1) | 8 (0.1) | 19 (0.2) |
| Judaism   | 1 (0.0)   | 2 (0.0)     | 0 (0.0)     | 0 (0.0)     |
| Marital status |      |      |      |           |
| Never married | 368 (94.9) | 167 (2.2) | 376 (3.9) | 225 (2.3) |
| Married    | 3883 (52.0) | 2839 (38.1) | 4972 (51.0) | 4086 (41.9) |
| Widow/Widower | 4 (0.1) | 192 (2.6) | 7 (0.1) | 78 (0.8) |
| Divorced   | 2 (0.0)   | 3 (0.0)     | 0 (0.0)     | 0 (0.0)     |
| Education  |      |      |      |           |
| Not applicable (up to 5 years) | 87 (1.2) | 36 (0.5) | 74 (0.8) | 47 (0.5) |
| Illiterate | 1760 (23.6) | 1586 (21.0) | 1484 (15.2) | 1566 (16.1) |
| Primary    | 1452 (19.5) | 1144 (15.3) | 1982 (20.3) | 1702 (17.4) |
| Secondary  | 630 (8.4)  | 328 (4.4)   | 1163 (11.9) | 745 (7.6) |
| Higher secondary | 167 (2.2) | 72 (1.0) | 394 (4.0) | 206 (2.1) |
| Graduate and above | 158 (2.1) | 56 (0.8) | 263 (2.7) | 130 (1.3) |
| Occupation |      |      |      |           |
| Not applicable (up to 5 years) | 87 (1.2) | 36 (0.5) | 74 (0.8) | 47 (0.5) |
| Service    | 424 (5.7)  | 58 (0.8)    | 648 (6.6)   | 170 (1.7)   |
| Business   | 512 (6.9)  | 19 (0.3)    | 603 (6.2)   | 16 (0.2)    |
| Agriculture | 1124 (15.1)| 29 (0.4) | 1621 (16.6) | 28 (0.3) |
| Day labourer | 266 (3.6) | 4 (0.1) | 514 (5.3) | 21 (0.2) |
| House wife | N/A       | 2755 (36.9) | N/A | 3571 (36.6) |
| Retired/aged | 1486 (19.9) | 191 (2.6) | 1447 (14.8) | 391 (4.0) |
| Industrial worker | 68 (0.9) | 17 (0.2) | 116 (1.2) | 65 (0.7) |
| Student    | 271 (3.6)  | 111 (1.5)   | 245 (2.5)   | 179 (1.8)   |

Table 1. Gender-and yearwise socio-demographic characteristics of the cancer patients attending at National Institute of Cancer Research and Hospital (NICRH), Dhaka, Bangladesh during the period of 2008 to 2010.
Table 2. Year-wise distribution of different cancers according to ICD-O classification.

| ICD-O | Topography                      | 2008      | 2009      | 2010      | 2008-2010  |
|-------|---------------------------------|-----------|-----------|-----------|------------|
|       |                                 | N(%)      | N(%)      | N(%)      | N(%)       |
| 00-14 | Lip, oral cavity and pharynx    | 905 (12.1)| 1114 (11.4)| 1149 (11.4)| 3168 (11.6) |
| 15-26 | Digestive organ                 | 1344 (18.0)| 1832 (18.8)| 1868 (18.6)| 5048 (18.5) |
| 30-39 | Respiratory system and intrathoracic organs | 1765 (23.7)| 2266 (23.2)| 2273 (22.6)| 6304 (23.1) |
| 40-41 | Bones, joints and articular cartilage | 147 (1.9)  | 55 (0.6)  | 82 (0.8)  | 284 (1.1)  |
| 42    | Haemopoietic and reticuloendothelial systems | 62 (0.8)  | 40 (0.4)  | 46 (0.4)  | 148 (0.5)  |
| 44    | Skin                            | 94 (1.3)  | 89 (0.9)  | 95 (0.9)  | 278 (1.0)  |
| 47    | Peripheral nerve and autonomic nervous system | 1 (0.0)  | 4 (0.1)  | 6 (0.1)  | 11 (0.1)  |
| 48    | Retroperitoneum and peritoneum   | 18 (0.2)  | 30 (0.3)  | 40 (0.4)  | 88 (0.3)  |
| 50    | Connective, subcutaneous and other soft tissues | 150 (2.0) | 319 (3.3) | 347 (3.5) | 816 (2.9) |
| 51-58 | Female genital organs           | 942 (12.6)| 1112 (11.4)| 1201 (11.9)| 3255 (11.9) |
| 60-63 | Male genital organs             | 129 (1.7) | 147 (1.5) | 177 (1.8) | 449 (1.7)  |
| 64-68 | Urinary tract                   | 199 (2.7) | 249 (2.6) | 163 (1.6) | 611 (2.2)  |
| 69-72 | Eye, brain and other parts of CNS | 194 (2.6) | 178 (1.8) | 185 (1.8) | 557 (2.1)  |
| 73-75 | Thyroid and other endocrine glands | 77 (1.1)  | 104 (1.1) | 129 (1.3) | 310 (1.1)  |
| 76    | Other ill defined sites          | 56 (0.8)  | 72 (0.7)  | 76 (0.8)  | 204 (0.8)  |
| 77    | Lymph nodes                     | 520 (7.0) | 773 (7.9) | 801 (7.9) | 2094 (7.7) |
| 80    | Unknown primary site            | 96 (1.3)  | 176 (1.7) | 187 (1.9) | 459 (1.7)  |
| Total |                                 | 7458 (100.0)| 9756 (100.0)| 10067 (100.0)| 27281 (100.0) |

ICD-O: International Classification of Diseases for Oncology

Table 3. Top-10 Leading cancer prevalence during 2008 to 2010.

| Position | Cancer site               | 2008      | 2009      | 2010      | 2008-2010  |
|----------|---------------------------|-----------|-----------|-----------|------------|
|          | Cancer site N(%)          | Cancer site N(%) | Cancer site N(%) | Cancer site N(%) |
| 1        | Lung                      | 1299 (17.4)| Lung     | 1708 (17.5)| Lung     | 1908 (18.9)| Lung     | 4915 (17.9) |
| 2        | Breast                    | 754 (10.1)| Breast   | 1189 (12.2)| Breast   | 1242 (12.3)| Breast   | 3185 (11.5) |
| 3        | Cervix                    | 694 (9.3)| Cervix    | 849 (8.7)| Cervix    | 989 (9.8)| Cervix    | 2532 (9.2)  |
| 4        | Lymph node and lymphatics | 467 (6.3)| Lymph node and lymphatics | 680 (6.9)| Lymph node and lymphatics | 801 (7.9)| Lymph node and lymphatics | 1948 (7.0) |
| 5        | Oesophagus                | 367 (4.9)| Oesophagus | 500 (5.9)| Oesophagus | 570 (5.7)| Oesophagus | 1437 (5.5) |
| 6        | Stomach                   | 286 (3.8)| Stomach   | 420 (5.1)| Stomach   | 487 (4.6)| Stomach   | 1193 (4.5) |
| 7        | Oral Cavity               | 248 (3.3)| Liver     | 298 (4.3)| Oral Cavity | 354 (3.5)| Oral Cavity | 880 (3.3)  |
| 8        | Larynx                    | 228 (3.1)| Liver     | 278 (3.3)| Liver     | 342 (3.4)| Liver     | 855 (3.5)  |
| 9        | Liver                     | 215 (2.9)| Larynx    | 253 (2.6)| Larynx    | 298 (2.9)| Larynx    | 779 (2.9)  |
| 10       | Gall bladder              | 152 (2.0)| Gall bladder | 192 (1.9)| Gall bladder | 192 (1.9)| Gall bladder | 536 (1.9)  |

ICD-O: International Classification of Diseases for Oncology

Fig. 2. Gender-wise ranking of top 10 leading cancers (%) during 2008 to 2010 (n=27281; Male=15,333 & Female=11,948).
Discussion

Using cancer registry data of 2,7281 patients at NICRH in Dhaka, Bangladesh we report increasing rate of cancer incidence over years. Higher rate of cancers among illiterate and aged people, lung cancer and breast cancer was the leading cancer among male and female, respectively.

Lack of adequate awareness about healthy life style and healthy diet is directly related with the literacy of a nation. Our findings that illiterate person had more cancer than others was in agreement with the study of Kachroo S & Etzel CJ\(^1\). Like other developing countries in Africa and Asia, Bangladesh also have low literacy rate\(^2\), especially in the rural Bangladesh. Although

Fig. 3. Geographical distribution of cancer patients attending at National Institute of Cancer Research and Hospital (NICRH), Dhaka, Bangladesh during the period of 2008 to 2010.
we could not report about cancer prevalence in rural Bangladesh, we believe, most of the cancers in rural areas are underreported because of lack of smooth access to health services for the rural people. Moreover, because of low level of awareness, people with cancer usually seek treatment from the traditional healers, including spiritual healers, homeopathy, unani and ayurveda. Most of these patients die without being recognized that they had cancers. Poverty adds additional fuel on this havoc.

We found the leading cancers in Bangladesh were the lung cancer in first rank followed by breast cancer and cervical cancer irrespective of sexes. Similar results were found from previous report\textsuperscript{18} at NICRH in Bangladesh. However, two other studies reported lung cancer is the number two in rank among South Asian countries and other developing countries in the world\textsuperscript{19, 20}. This might be due to the higher prevalence of smoking in Bangladesh than those studied countries. The use of smoked tobacco in Bangladesh was among males 44.7% and females 1.5%; and smokeless tobacco use among males 26.4% and females 27.9\%\textsuperscript{21, 22}. Smoking was considered as the single most preventable risk factor for lung cancer.

The risk of developing lung cancer increases with age\textsuperscript{20} which supports our findings that highest cancer was among 45-54 year age group. It is because harmful toxic effects of unhealthy life style and diet accumulate as age increases leading to cancer among this age group. However, our findings that cancer declined steadily after this age group does not contradicts with the trend. Because, half of the cancer patients in Bangladesh die within five years of diagnosis, rate is low among extremely older population\textsuperscript{13, 18}. Patients usually visit a cancer specialist at the very advanced stage fearing huge costs.

The present study found breast cancer as the leading cause of cancer among female in Bangladesh which was consisted with previously published report\textsuperscript{18}. Some studies\textsuperscript{19, 20} conducted in South Asia and other developing countries confirmed the breast cancer as 2\textsuperscript{nd} or 3\textsuperscript{rd} cancer among female. The high rate of breast cancer in Bangladesh might be due to several reasons, including lack of awareness about the benefit of breast self-examination (BSE) and early reporting to the doctor, poor compliance with follow-up for women with positive results, lack of education, lack of trust in the existing healthcare system and chances of getting cured for instances. However, certain cultural and religious practices were strongly influence the problem delay particularly among women. Discouraging about free communication between the sexes contributes their inhibition to show their disease. Moreover, even many women cannot comfortably discuss symptomatology involving the female organs with male physicians, their husbands or other women\textsuperscript{23}.

We also found cervical cancer as one of the most common (2\textsuperscript{nd}) cancer among female in Bangladesh which was in line with some previously published studies\textsuperscript{18-20}. Some studies\textsuperscript{24} showed that 81\% of cervical cancer cases occur in Latin America, Africa, Eastern/Southern Europe, Pacific Island Nations and South-central Asia. Moreover, cervical cancer was the leading cause of cancer related death among women in developing countries\textsuperscript{25}. The major risk factors for cervical cancer were identified as Human papilloma virus (HPV), early sexual practice, multiple sexual partners, menstrual hygiene and unprotected sex\textsuperscript{26-28}. Most of these risk factors are heavily prevailing among Bangladeshi population. Early sexual exposure was also identified as the risk factors for cervical cancer by a study done in Darjeeling, India\textsuperscript{29}.

The strength of our study was large number of cancer patients attending at NICRH. This is a tertiary level specialized hospital for cancer patient care and education of professionals. People from all corner of the country come to this hospital. Although patients have to bear or share cost for some of the treatment modalities, the treatment is given free in general. Therefore this hospital can attract patients from all socioeconomic strata for diagnostic, curative and palliative cares. Despite these facts, possibility of bias that people from around Dhaka city was included more in the cancer registry, so in our study, cannot be ruled out. Moreover, we could not consider patients who used to seek treatment from the private hospitals, from abroad or those who died at their residence. In conclusion, an increasing trend of cancer was observed in Bangladesh. Lung and breast cancer was the leading cancer in male and female, respectively; and most frequent cancer was observed among illiterate and middle aged population. Whereas, cultural, religious, diet- and lifestyle-related issues are important in this context, we recommend exerting proper emphasis specifically on anti-tobacco campaign and breast self-examination for the females in addition to increasing overall awareness against cancers in Bangladesh.

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Competing interests

The authors declare that they have no competing interests.

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