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CANCER INCIDENCE IN A TERTIARY CARE CENTRE IN ANDAMAN AND NICOBAR ISLANDS: A 10 YEAR RETROSPECTIVE STUDY

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ABSTRACT **Background:** Andaman and Nicobar islands are group of islands situated in Bay of Bengal. Health care delivery system is controlled by health sevices with 473bedded hospital. Previous efforts to report estimates of cancer incidence and mortality in India and its different parts include the National Cancer Registry Programme Reports, Sample Registration System cause of death findings, Cancer Incidence in Five Continents Series, and GLOBOCAN. Data were retrospectively reviewed over a period of ten years from January 2003 to January 2013. Of the 6,254 cases received in the department, histopathologically proven cases of carcinoma were included in this study. Clinical details including detailed history were obtained from the medical records. Among these, most frequently involved site of malignancy was cervix (134 cases) followed buccal mucosa (92 cases), breast (30 cases) and 24 patients of thyroid malignancy. Collaborative multi-institutional research efforts on cancer risk factors can help address such knowledge gaps, as well as lead to a better understanding of the reasons for the substantial decreases or increases in the incidence of different types of cancers in different parts of India. Cancer incidence helps the public health professionals to understand the dynamics of cancer incidence for the formulation of future strategies.

KEYWORDS : Cancer registry, Histopathology, Andaman & Nicobar, Awareness.

INTRODUCTION

Andaman and Nicobar islands are group of islands situated in Bay of Bengal more than 1000 km away from mainland India with an estimated population of 3.81 lakhs, of which 62.3% is rural. Overall, literacy rate is 86.6% and female literacy is 74.71. Healthcare delivery for these islands is exclusively controlled by Directorate of Health Services (DHS), Andaman and Nicobar (A&N) islands and is provided free of cost. The referral hospital 473 bedded with round the clock availability of surgeons, obstetricians, anaesthetists, operation room facilities, and blood bank is situated in Port Blair. There are 2 district hospitals, 5 urban health centres, 4 community health centres, 20 primary health centres, and 115 subsidiary health centres situated across the island. Cancer is the second leading cause of death globally after cardiovascular diseases.[1] Patients with cancer generally have a poorer prognosis in low-income and middle- income countries, including India, because of relatively low cancer awareness, late diagnosis, and the lack of or inequitable access to affordable curative services compared with patients in high-income countries.[2,3] India has a population of 1·3 billion spread across 29 states and seven union territories, and many of the states are as large as other countries, with varying degrees of development, population genetics, environments and lifestyles, leading to a heterogeneous distribution of disease burden and health loss.[4] There have been previous attempts to describe national-level patterns of cancer burden and epidemiology in different parts of India as well as areas of importance for cancer control[5–20] but a systematic and comprehensive understanding of the magnitude and time trends of all types of cancers in each state of India is not readily available. Cancer incidence in Andaman and Nicobar islands is constantly on a rise. This is our first study in Andaman and Nicobar islands highlights the incidence of malignancies in this population with emphasis on the clinico-epidemiological profile and histological subtype.

MATERIAL AND METHODS

The archives of department of histopathology GB Pant Hospital, Andaman and Nicobar Islands were retrospectively reviewed over a period of ten years from January 2003 to January 2013. Of the 6,254 cases received in the department, histopathologically proven cases of carcinoma were included in this study. Clinical details including detailed history were obtained from the medical records. The biopsies were fixed in 10% neutral buffered formalin and sent for histopathological evaluation. Diagnosis was confirmed on hematoxylin and eosin (H&E) stained formalin fixed paraffin embedded sections. The H&E stained sections was reviewed by pathologist and correlated with the clinical findings.

RESULTS

Of the 6,254 cases received in our department, 373 histopathologically proven carcinoma cases were included in the study. The site-wise categorisation of these cases is described in Table 1. Among these, most frequently involved site of malignancy was cervix (134 cases) followed buccal mucosa (92 cases), breast (30 cases) and 24 patients of thyroid malignancy.

Majority cases (130/134) of cervical malignancy were squamous cell carcinoma histopathologically with four cases of endocervical adenocarcinoma. Carcinoma of the buccal mucosa showed squamous differentiation in 90 cases with two cases of adenosquamous carcinoma. Of the 30 female patients with breast malignancy, 26 patients were diagnosed with infiltrating ductal carcinoma and two cases each of medullary carcinoma and mucinous carcinoma. Follicular carcinoma was the most common subtype of thyroid malignancy reported as seen in 16/24 cases followed by 6 cases of papillary carcinoma thyroid and two cases of medullary carcinoma of thyroid gland.

Of the female genital tract malignancies, following cervical carcinoma the next most common site of involvement was ovary. Of the ten cases, 6 cases of papillary serous cystadenocarcinoma and 4 cases of mucinous adenocarcinoma were reported. Of the 9 cases of endometrial adenocarcinoma observed in our study, majority of the cases were papillary adenocarcinoma (5/9) histopathologically followed by two cases of endometrioid type and two cases of chorio-carcinoma.

The most common cutaneous malignancy was basal cell carcinoma (8 cases) following which were malignant melanoma (4 cases) and squamous cell carcinoma (2 cases). Two cases of cutaneous metastatic deposits with unknown primary were also observed.

In the head and neck region apart from buccal mucosa and thyroid gland, 5 patients with salivary gland malignancy were observed. Majority of these were seen involving the parotid gland region including 7 cases of adenoid cystic carcinoma and a single case of carcinoma ex-pleomorphic adenoma. Minor salivary gland involvement was seen in a single case of acinic cell carcinoma involving the hard palate.

Thyroid cancer had the tenth highest incidence rate among females in 2016 in India (2·5 per 100 000, 95% UI 2·3–2·6). There were 21 000 (95% UI 20 000–23 000) incident cases in India, of which 74·3% were in females, and there were 106 000 (101 000–115 000) prevalent cases[31, 49]. The age-standardised incidence rate of thyroid cancer increased substantially by 25·6% (95% UI 12·6–52·3) from 1990 to 2016. This rate varied 6·1 times across the states of India in 2016[43–48]. The crude incidence rate of thyroid cancer was highest in females in Kerala, followed by Sikkim, Nagaland, and Goa in 2016.[49]

Gastro-intestinal malignancies were seen in a total of patients of which gastric adenocarcinoma was most commonly seen in 8 patients followed by 5 cases and 4 cases of colonic and rectal adenocarcinoma respectively. Hepato-biliary involvement was seen in 10 cases of gall bladder carcinoma of which 9 cases were typed as adenocarcinoma on histopathological evaluation and a single case of adenosquamous carcinoma. A single case of hepatocellular carcinoma was also observed in the hepato-biliary system. Genito-urinary system saw involvement of kidney in 4 cases. In male patients there were 4 cases of prostatic adenocarcinoma encountered in our study.

TUMOUR	NUMBER OF CASES	AGE RANGE (YEARS)	MEAN AGE (YEARS)
Cervix (squamous cell carcinoma)	134	25-61	43.2
Buccal mucosa (squamous cell carcinoma)	92	31-58	34.4
Breast (infiltrating duct Carcinoma)	30	30-55	36.4
Thyroid carcinoma	24	29-45	34.4
Gall Bladder adenocarcinoma	10	45-65	48.8
Ovarian carcinoma	10	22-54	37.7
Endometrial adenocarcinoma	9	38-59	45.5
Salivary gland carcinoma	9	35-62	40.4
Basal cell carcinoma	8	30-57	32.2
Gastric carcinoma	8	40-62	52.4
Lymphoma	8	17-65	30.1
Colonic adenocarcinoma	5	45-55	50.0
Prostate adenocarcinoma	4	55-72	60.2
Malignant melanoma	4	35-55	45
Rectal adenocarcinoma	4	42-57	51.2
Renal cell carcinoma	4	47-59	50.6
Ewing's sarcoma	3	10years, 12 years, 13 years	-
Cutaneous metastatic deposit	2	55 years, 62 years	-
Carcinoma foot (cutaneous)	2	39 years, 47 years	-
Osteosarcoma	2	15 years, 20 years	-
Hepatocellular carcinoma	1	59 years	-

Bone localisation was relatively uncommon with 4 cases of Ewing's sarcoma and two cases of osteosarcoma. Apart from carcinomas, 8 cases of lymphomas were also observed with Hodgkin's lymphoma being categorised in 5 cases and 4 cases of non-Hodgkin's lymphoma.

Retrospective analysis of the clinical findings of these patients was done. The age range and mean patient age of the site-specific carcinomas are enlisted in Table 1.

DISCUSSION

Cancer registration is a systematic collection of data on the incidence and characteristics of reportable neoplasms with the purpose of aiding to assess and curb the impact of malignancies on the community. In patients registered with G.B Pant hospital, females were more affected than males. The results were in disagreement to that of study conducted by Kalyani et al [6-21]. Ten years cancer analysis in Andaman and Nicobar Islands depicts female preponderance of carcinomas in Andaman & Nicobar Islands which is different from the data collected from rest of the country. The age-standardise death rate for cancer increased for males during this period, suggesting differences by sex. Males had higher MI ratios than females in every state of the country. The trends observed in sex-specific and cancer type- specific incidence rates over time in India are likely due to a variety of factors, such as population ageing, changes in cancer literacy, detection, health-care access, and a variety of risk factors. We highlight some of the key risk factors that are associated with the highest burden of cancers in India and in our island.

The total number of cases of head and neck cancer are on increasing trend in the island and also in the country. The number of incident lip and oral cavity cancer cases in India in 2016 was 113 000 (95%UI 106 000–118 000) and the prevalent cases were 397 000 (371 000–412 000) [31]. There was a substantial reduction in the age-standardised incidence rate of lip and oral cavity cancer (6·4%; 95% UI 0·4–18·6) from 1990 to 2016 in India. Lip and oral cavity cancer were the most common incident cancer in males in India in 2016 [32]. The crude incidence rate was substantially higher in males than in females [33,34]. The age-standardised incidence rate for lip and oral cavity cancer varied 5·1 times among both sexes combined across the states of India in 2016 [34-38]. Smokeless tobacco, alcohol use and smoking were the leading risk factors in GBD for lip and oral cavity cancer in India in 2016 to which 33·2%, 29·8%, and 20·9% of the lip and oral cavity cancer DALYs could be attributed, respectively.

Cervical carcinomas are most prevalent in population of Andaman & Nicobar Islands, followed by oral cancers. Most of the patients presented to the Oncology OPD were in the advanced stage, pertaining to unawareness and neglect. The reasons for such a high incidence should be explored for better control of malignancies in the island. Thus, at this stage, cancer registration becomes much more rewarding, and this end justifies every effort to undertake the job, in spite of the difficulties. The reasons for this should be explored for better control of malignancies in the island Cervical cancer was the second most common cancer in females in India in 2016, with 77000 (95% UI 68000–96000) incident cervical cancer cases in India in 2016 and 288000 (247000–342000) prevalent cases [31]. The age-standardised incidence rate of cervical cancer decreased substantially by 39·7% (95% UI 26·5–57·3) in India from 1990 to 2016. The age-standardised incidence rate for cervical cancer varied 2·8 times in females across the states of India in 2016. The possible explanation to this is increased exposure to HPV infection, increased tendency and culture of having multiple sexual partners and drug abuse & addiction and decreased immunity.

In our study we had encountered other carcinomas of female reproductive system. Ovarian cancer had the sixth highest incidence rate among females in 2016 in India (4·0 per 100000, 95% UI 3·7–4·3), with 26000 (95% UI 24000–27000) incident cases and 76 000 (69 000–80 000) prevalent cases [31, 39]. The age-standardised incidence rate of ovarian cancer increased substantially by 28·6% (95% UI 19·2–41·6) from 1990 to 2016. This rate varied 3·7 times across the states of India in 2016 [40–48]. The crude incidence rate was highest in Kerala, followed by Delhi, Arunachal Pradesh, and Punjab [49].

Breast cancer was the first or second leading cause of cancer deaths among females in 28 Indian states in 2016. The mean age at presentation at our institute was 36.4years. The estimated number of incident breast cancer cases in India in 2016 was 118 000 (95% UI 107 000–130 000), 98·1% of which were in females, and the prevalent cases were 526 000 (474 000–574 000). Breast cancer is the leading cancer in Indian females, accounting for the largest crude incidence rate and prevalence of any cancer type [49, 50]. Over the 26-year period, the age- standardised incidence rate of breast cancer in females increased by 39·1% (95% UI 5·1–85·5) from 1990 to 2016, with increase observed in every state of the country [51]. The age-standardised incidence rate of breast cancer varied 3·2 times in females across the states of India in 2016. Females, presenting at younger age with aggressive histology have more mortality and chances of metastasis. For breast cancer, a substantial increase in age-standardised incidence rate is consistent with changes in some risk factors over time in India, such as later age at first birth, lower parity, and increase in overweight and obesity.[32,36,37] Five year survival analysis for higher stages shows increased mortality as compared to earlier stages. Early diagnosis of the disease can reduce mortality associated with carcinoma breast. Community education and awareness campaigns for the general public may help in early detection.We refer to tracheal, bronchus, and lung cancer as lung cancer in this report for simplicity. The number of incident lung cancer cases in India in 2016 was 67000 (95% UI 63 000–72 000), 72·2% of which were in males, and the prevalent cases were 74 000 (70 000–80 000) [31]. This cancer was the second most common incident cancer among males in 2016 (49–50). The age-standardised incidence rate of lung cancer varied 8 times in both sexes combined across the states of India in 2016 [43–48]. The crude lung cancer incidence rate in males was highest in Kerala and Mizoram, and in females was highest in Mizoram and Manipur [49, 50]. Lung cancer was the first or second leading cause of cancer deaths in 19 states for males and four states for females in 2016. Tobacco use and air pollution were the leading risk factors in GBD for lung cancer in India in 2016 to which 43·2% and 43·0% of the lung cancer DALYs could be attributed, respectively [41, 42].In our study cases of lung cancer were scanty due to the referral of cases to TB and Chest institute and direct reporting of cases to Cancer registry at Chennai. The absence of change in the age-standardised incidence rate of lung cancer in India might be related to the mixed trends of its major risk factors, which include decrease in smoking and household air pollution but an increase in ambient air pollution, but also due to the patterns of other unknown risk factors. [32,34].

Total cases of gastrointestinal malignancies reported in our institute are 10 during the study tenure. The substantial decrease in the age-standardised incidence rate of oesophageal cancer might be partly due to the decrease in smoking prevalence over the 26-year period and in smokeless tobacco use over the past 10 years.[32,34] The substantial decrease in the age-standardised incidence rate of stomach cancer across the country might be due to lifestyle changes such as reduced consumption of salt-preserved foods, better availability of refrigeration, and increasing fruit consumption, and to decreases in smoking prevalence.[32–34]The number of incident colon and rectum cancer cases in India in 2016 was 63000 (95% UI 58000–66000) and the prevalent cases were 185000 (171000–195000).[31] Colon and rectum cancer incidence rate in both sexes was higher in the high ETL as compared with other ETL state groups [49, 50]. The age-standardised incidence rate for colon and rectum cancer varied 1·9 times across the states of India in 2016 [43–48]. Colon and rectum cancer was the third to fifth leading cause of cancer deaths in 24 states for females and 16 states for males. Dietary risks were the leading risk factor in GBD for colon and rectum cancer in India in 2016 to which 43·2% of the colon and rectum cancer DALYs could be attributed [41, 42]

We have reported only one case of hepatocellular carcinoma. Liver cancer had the ninth highest incidence rate among males in 2016 in India (3·1 per 100 000, 95% UI 2·9– 3·2). There were 30000 (95% UI 29000–32000) incident cases in India, of which 68·9% were in males, and 12 000 (11 000–14 000) prevalent cases [31, 50]. The age-standardised incidence rate of liver cancer increased substantially by 32·2% (95% UI 11·4–41·3) from 1990 to 2016. This rate varied 7·9 times across the states of India in 2016 [43–48]. The crude incidence rate for liver cancer in males in 2016 was highest in Arunachal Pradesh, followed by Kerala, Sikkim, and Mizoram [50]. The age-standardised incidence rate of the first three of these cancers decreased in India from 1990 to 2016, and that of liver increased. While tobacco use in India has decreased during this period, alcohol use has increased. [32] Gallbladder and biliary tract cancer had the ninth highest incidence rate among females in 2016 in India (2·6 per 100 000, 95% UI 2·3–2·8). There were 26 000 (95% UI 23 000–29 000) incident cases in India, of which 64·4% were in females, and there were 21000 (18000–23000) prevalent cases [31, 49]. This rate varied 5·9 times across the states of India in 2016.

The drop in incidence rate of lip and oral cavity, oesophageal, and larynx cancers could be partly related to a larger influence of tobacco than alcohol on these cancers, and the increase in incidence rate of liver cancer could be partly related to a larger influence of alcohol than tobacco on this cancer, in addition to the trends of yet unknown other risk factors contributing to all of these cancers. Collaborative multi-institutional research efforts on cancer risk factors can help address such knowledge gaps, as well as lead to a better understanding of the reasons for the substantial decreases or increases in the incidence of different types of cancers in different parts of India. Detailed decomposition analyses are needed to tease apart the contribution of population structure changes, risk factors, interventions, and other determinants to the trends of leading cancers in India.

The heterogeneity of the incidence rate of different types of cancers across India is vast. Major variations exist even within the same geographical region, such as neighbouring states in the northeast—for example, a 15 times difference in age-standardised incidence rates of nasopharynx cancer between the neighbouring north-eastern states of Nagaland and Tripura. Examples of the heterogeneous distribution of important risk factors and the corresponding distribution of associated cancers are also insightful. The states in the northeast of India generally have high tobacco use as well as a high incidence of lung, oesophageal, nasopharynx and other pharynx cancers that are associated with tobacco use. There are also unique tobacco consumption patterns in these states, such as use of tobacco-infused water in Mizoram.[39,40] HPV and cervical cancer are both high in Dindigul in Tamil Nadu,[41] consumption of smoked or preserved meats and stomach cancer are high in Mizoram,[42] and delayed childbearing and lower parity are high in Kerala as is breast cancer.[43] The many variations between the states indicate the need for state-specific approaches for cancer control. If the reasons for the heterogeneous distribution of the major cancer types in different parts of India are understood better through large-scale collaborative research, this knowledge could help plan more specific efforts to reduce the cancer burden across the states of India.

The National Cancer Control Programme was initiated by the Government of India in 1975 to equip tertiary care cancer hospitals and institutions to implement systematic, equitable, and evidence-based strategies for prevention, early detection, diagnosis, treatment, and palliation, using available resources.[44] State cancer institutes and tertiary care cancer centres have been established under this programme that are responsible for improved cancer awareness and management at the state level.[45] Despite these attempts, access to critical cancer treatment is low in the country. For example, availability of radiotherapy machines is poor, there are delays in treatment, and there is geographic inequity in the distribution of such resources.[10,11,46] With the launch of the National Programme for Control of Cancer, Diabetes, CVD and Stroke in 2010 in India, the cancer control efforts are now part of this umbrella programme for non- communicable diseases.[47] The national programme aims to tackle cancer by addressing preventable common risk factors through community-level, cost-effective screening for high-burden cancers, which include clinical breast examination for breast cancer, visual inspection with acetic acid for cervical cancer and visual examination for oral cancers.[14] However, there are many challenges with these efforts, including difficulties with trained human resources, follow-up of positive tests, timely diagnosis, and well-tracked referral pathways.[48] Additionally, there are limited population-level screening modalities available for some of the cancers responsible for the highest cancer burden in India, such as stomach and lung cancers. Primary prevention should therefore be promoted for these cancers, which can be guided by the heterogeneity between the states in this report. For secondary prevention, less invasive tests for H pylori may offer cost-effective first-line tests for referrals to more invasive endoscopic tests for early detection of stomach cancer. [49] Faecal occult blood testing as a non-invasive, cost-effective approach to screen for colorectal cancer should also be considered.[50]

In ideal situation, national and state-level efforts should coordinate to facilitate the development of a prevention-to-palliation system of upward referral for early confirmatory diagnosis and prompt treatment of cancers, and downward referral for adequate follow-up, including palliative care and pain relief. The experience of some states can be useful to develop such strategies. For example, the Tamil Nadu Health Systems Project paved the way for lessons on breast and cervical cancer screening, from which the importance of community awareness, referral pathways, health management information systems, and trained human resources emerged as critical factors for a successful screening programme.[48,51]Shortage of appropriately educated and trained medical officers for treatment, management, and palliative care for cancer patients, particularly outside metropolitan cities, remains a challenge across the country.[10] Recent attempts to address this gap include training through the Extension of Community Healthcare Outcomes tele-mentoring model for primary health-care providers and specialists on cancer screening and management by the National Institute of Cancer Prevention and Research.[52] Attempts are also being made to strengthen tertiary cancer management by developing evidence-based guidelines through the knowledge exchange platform of the National Cancer Grid of India.[12] Placing the India cancer trends in the global context, the overall age-standardised incidence rate of cancers has been stable in India during the past quarter century, but it has increased in the other BRICS countries (Brazil, Russia, China and South Africa) where the rate is currently about double that in India.[53] India should avoid the increasing trends observed in these countries by establishing adequate preventive measures that are consistent with the heterogeneity of cancer distribution in different parts of the country.

Cancer patients in India incur heavy out-of-pocket expenditures.[11,54] The insurance programmes in some states and a previous national insurance scheme have attempted to minimise the impact of this on households.[55–57] The recently announced National Health Protection Mission (Ayushman Bharat), which aims to provide substantial health insurance coverage for 500 million people from low-income households, has the potential to reduce the economic burden of cancer and other non-communicable diseases at the population level across the country.[58] It would be useful to ensure that all relevant aspects of cancer care are included in this health protection scheme.

This report provides a comprehensive descriptive epidemiology of cancer and its heterogeneity across all the states and compered all these with the data obtained at our island. India pioneered the establishment and expansion of the National Cancer Registry Programme (NCRP) under the Indian Council of Medical Research through a network of cancer registries during the past 30 years, which now covers 23 states and union territories.[23]

The limitations of the findings in this report include the general limitations of the GBD approach that are described elsewhere.[1,25–28] Input data used to generate cancer mortality can be biased in multiple ways.[1] A high proportion of ill-defined cancer cases in the registry data or ill-defined causes of death in mortality data sources require redistribution of these cases, which can introduce bias. Underreporting of cancers that require advanced diagnostic techniques (eg, leukaemia, brain, pancreatic, and liver cancer) can be an issue in data from areas where access to these technologies is scarce. Conversely, misclassification of metastatic sites as primary cancer can lead to overestimation of cancer sites that are common sites for metastases like the brain or liver. A specific limitation for India is an inadequate cause of death reporting as part of the vital registration system, which reports medically certified cause of death only for a small proportion of deaths in India so far, with variable coverage across the states. The SRS provides cause of death data using verbal autopsy for all states in India, which is a reasonable alternative data source when the cause-specific data are not fully available from vital registration systems.[4]However, this situation highlights the need to improve vital registration and improve training to code cause of death across India.

CONCLUSION

Our study is the largest epidemiological study focusing on cancer incidence in Andaman and Nicobar Islands. Cancer incidence helps the public health professionals to understand the dynamics of cancer incidence for the formulation of future strategies.

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