Review Article

DOI: 10.5455/2394-6040.ijcmph20150202

An epidemiological analysis of cancer patients admitted to hospitals in Chennai, Tamil Nadu

Sekaran Gopalakrishnan*, Ramachandran Umadevi

Department of Community Medicine, Sree Balaji Medical College & Hospital, Bharath University, Chrompet, Chennai-600044, Tamil Nadu, India

Received: 9 December 2014 Accepted: 10 January 2015

***Correspondence:** Dr. Sekaran Gopalakrishnan, E-mail: drsgopal@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

India is now in the epidemiological transition stage of having to face the challenge of increasing number of both communicable and non-communicable diseases burden. Recently cancers have become the second most fatal disease among the non-communicable diseases category next only to cardiovascular diseases. Cancer affects all age groups and both sexes with a high mortality rate and low survival rate. Cancer registration is the process of continuing systematic collection of epidemiological data on reportable neoplasms with the purpose of helping to assess and control the impact of malignant disease in the community. The cancer registries are mainly of two types: Population based cancer registry and hospital based cancer registry. The Population-Based Cancer Registries (PBCRs) are aimed to identify all cases of cancer that occur in a defined population while Hospital Based Cancer Registries (HBCRs) aim at the improvement of cancer therapy. Recently, the Madras Metropolitan Tumour Registry (MMTR) Chennai had published a report on various hospital based statistics about cancer patients from 2007-2010. The report gives exhaustive details of nearly 13 categories of variables related to cancer management and characteristics attributed to both males and females patients separately. Objective of this article is to analyze the epidemiological details of cancer patients registered with the reporting hospitals in Chennai in relation to the age, sex, site of cancers, diagnostic methods, treatment of choice, mortality etc. among the cancer groups based on the cancer registry for the period from 2007 to 2010, in order to understand the epidemiological trend of the disease in and around Chennai at present.

Keywords: Cancer epidemiology, Cancer registry, Madras metropolitan tumour registry

INTRODUCTION

The demographic transition in India is shown in the form of declining fertility levels and increasing life expectancy. As the life expectancy at birth increases, the percentage of geriatric population also rises. Higher incidence of non-communicable diseases, especially cancer is positively associated with percentage of aged population of a country.¹ Population ageing is often assumed to be the main factor driving increases in cancer incidence, death rates, and health-care costs.² Non-communicable diseases including cancer are emerging as major public health problems in India. These diseases are lifestyle related and have a long latent period and needs specialized infrastructure and human resource for prevention and treatment. The main risk factors of the major non-communicable diseases including cancers are tobacco usage, unhealthy dietary habits, inadequate physical activity and alcohol consumption. Based on the cancer registry data it is estimated that there will be about 8 lakh new cancers cases in India every year and at any given point of time there is likely to be 3 times this load that is about 24 lakh cases.³ Cancer has now attained the status of the second most common non communicable disease in India responsible for maximum mortality with about 0.3 million deaths per year. This can be attributed to the poor availability of preventive measures, diagnostic methods and treatment facilities for the disease. All types of cancers have been reported in Indian population. The causes of high incidence of these cancers may be both internal (genetic, mutations, hormonal, poor immune conditions) and external or environmental factors (food habits, industrialization, over growth of population, social conditions etc.).⁴

Cancer is a group of diseases with lot of similar characteristics. Cancer can occur in all living cells in the body and different cancer types have different natural history. Epidemiological studies have shown that about 80% of all cancers are environmental related. Lifestyle related risk factors are the most important and preventable among the environmental exposures.³

In India, lung and oral cancer are the most common types of cancers among men, whereas cervical and breast cancer among women. There were 556,400 cancer-related deaths in India in the year 2010. Out of which, 71% of cancer patients were of the age group between 30-69 years.⁵ Since cancer is the second largest noncommunicable disease in India, with a sizeable contribution in the total number of deaths, it is important for the public health professionals to understand the dynamics of cancer epidemiology for planning future strategies.¹ The World Cancer Report documents that cancer rates are set to increase at an alarming rate globally. World cancer rates are projected to increase by 50% (to 15 million) new cases by the year 2020.⁶

Cancer registries

The idea of recording information on all cancer cases in defined communities dates from the first half of the twentieth century, and there has been a steady growth in the number of such cancer registries since. Originally, they were concerned primarily with describing cancer patterns and trends. Later, many were able to follow up the registered patients and calculate survival. In the last 20 years the role of registries has expanded further to embrace the planning and evaluation of cancer control activities, and the care of individual cancer patients.⁷

Cancer registration is the process of continuing systematic collection of data on the occurrence, characteristics, and outcome of reportable neoplasms with the purpose of helping to assess and control the impact of malignant disease in the community. The cancer registries are mainly two types: population based cancer registry and hospital based cancer registry.

The Population-Based Cancer Registries (PBCRs) are aimed to identify all cases of cancer that occur in a defined population. PBCRs are an essential component of a fully developed cancer-control programme. In addition to providing information on current and future needs for services, they are used to monitor programmes of prevention, early detection and cure (treatment).⁷ Population-based cancer registries monitor the frequency of new cancer cases (so-called incident cases) every year in well-defined populations and over time by collecting case reports from different sources (treatment facilities, clinicians and pathologists, and death certificates).

Hospital based cancer registries (HBCRs) aim at the improvement of cancer therapy. Therefore they collect detailed data about diagnosis, therapy and survival of the cancer patients. The purpose of the hospital-based registry is to serve the needs of the hospital administration, the hospital's cancer programme, and above all, the individual patient. One of the functions of a hospital registry is to produce an annual report to the hospital administration on the cancer activities that have taken place during the year and to document things such as the cancer burden borne by the hospital.⁸

Hospital Based Cancer Registries (HBCRs) provide an idea of the magnitude and patterns of patient care in a given hospital. They help in planning the facilities required in the respective hospital and help in evaluation of outcome of treatment. They also contribute to the population based cancer registry in the given area and help to undertake epidemiologic research.

India is the one of the few developing countries that has formulated a national cancer control programme which envisages control of tobacco related cancers; early diagnosis and treatment of uterine cervical cancer; and distribution of therapy services, pain relief and palliative care through augmentation of health infrastructure.³

To understand the depth of the problem and cancer burden, The National Cancer Registry Programme (NCRP) was commenced by the Indian Council of Medical Research (ICMR) with a network of cancer registries across the country in December 1981. Three Population Based Cancer Registries (PBCRs) at Bangalore, Chennai and Mumbai and three Hospital Based Cancer Registries (HBCRs) at Chandigarh, Dibrugarh and Thiruvananthapuram were commenced from 1 January 1982.

The PBCRs have gradually expanded over the years and as of now there are 23 PBCRs under the NCRP network. The Madras Metropolitan Tumour Registry (MMTR), a Population Based Cancer Registry, was established at the Cancer Institute, Adayar (W.I.A) in 1981. It caters to an area of 170 square km and a population (entirely urban) of 4.6 million as per 2011 Census constituting 0.4% and 6.0% of total population of India and State of Tamil Nadu respectively. Registration of cases is done by active method and MMTR continues to get good support from all health care facilities in and around Chennai, with more than 240 sources of hospitals, nursing homes, clinics, pathology laboratories, imaging centers, hospices etc. both in the government and private sector. This helps MMTR to publish periodic reports and do epidemiological studies on cancer incidence pattern and trend.⁹

Recently, MMTR Chennai has published a report on various hospital based statistics of the different types of cancer patients enrolled, diagnosed, treated and their survival status etc. from 2007-2010. The report gives exhaustive details of nearly 13 categories of variables related to the cancer characteristics attributed to both males and females patients separately. Out of that few very relevant demographic, morbidity, diagnostic, therapeutic and mortality aspects have been analyzed here to understand the cancer trends in Chennai at present.

Objective of this article: In this review article, an attempt has been made to epidemiologically analyze the details of cancer patients registered with the reporting hospitals in Chennai in relation to the age, sex, site of cancers, diagnostic methods, treatment of choice, mortality etc. among the cancer groups based on the cancer registry for a period from 2007 to 2010, in order to understand the trend of the disease.

METHODOLOGY

This record based review was done using the data published in the national cancer registry. The data analyzed was taken from the Chennai registry which is known as the Madras Metropolitan Tumour Registry (MMTR). All Chennai hospitals catering to the cancer patients in the metropolitan area come under this registry. The hospital based data collected was for a period of four years from 2007-2010 which was published in national cancer registry website.¹⁰

The data was analyzed for age and sex wise distribution, followed by the leading types [causes] of cancer based on site of affection. The top ten cancers based on site of origin and the various methods of diagnosis of cancers for both the sexes were also compiled. Finally the total number of deaths due to cancer was analyzed. The age wise distribution was done in order to find out the age group wise distribution of cancer among the population. Based on the total number of deaths, the mortality to incident rate of cancer for Chennai was also calculated.

RESULTS OF THE ANALYSIS

Age and sex distribution

The analysis of the cancer registry data shows that the total number of cancer patients registered in the MMTR for the years 2007 to 2010 was 33230. Among them males were 15731 (47.34%) and females were 17499 (52.66%). Sex wise distribution among males shows that the highest incidence of cancer was found in the age group of 0-19 years and those above 70 years age group

(around 60% affected). While among females the highest incidence was found to be in the 30-49 year age group (around 61%) followed by 50-59 age group (around 54%). Thus it seems the young and the old among the males have more incidence of cancer while the middle aged women have more incidence of cancer (Table 1).

The data shows that the highest incidence of cancer was in the age group of 50 -59 years with 8776 (26.41%) cases followed by 60-69 years age group with 7446 (22.41%) and 40-49 years age group with 7105 (21.38%) cases. The least reported incidence was in the less than 10 year age group with 472 (1.42%) cases. The data from Table 1 shows that as age advances the incidence of cancer also increases. The incidence is more above the age of 40 years.

Table 1: Age group and sex wise distribution of prevalence of cancer among patients (2007-2010).

Age	Male		Female	;	Total	
group	No	%	No	%	No	%
0-9	292	61.86	180	38.14	472	1.42
10-19	511	60.62	332	39.38	843	2.54
20-29	836	52.48	757	47.52	1593	4.79
30-39	1397	39.36	2152	60.64	3549	10.68
40-49	2617	36.83	4488	63.17	7105	21.38
50-59	4020	45.81	4756	54.19	8776	26.41
60-69	4004	53.77	3442	46.23	7446	22.41
>70	2054	59.61	1392	40.39	3446	10.37
Total	15731	47.34	17499	52.66	33230	100.00

Cancer site of origin

The data was analyzed to find out the top cancer sites among males and females patients based on the site of origin diagnosed. Among the male patients, cancer of Stomach (9.2%) is the leading site followed closely by Ca lungs (8.9%). Cancer mouth, pharynx, leukaemias, tongue, oesophagus, colon-rectal and anal canal also were commonly seen. Among the female patients, cancer of cervix-uteri (25.5%) and Ca breast (22.4%) were the top cancer sites. This is followed by Ca ovary (5.3%), mouth (5.2%), leukaemias (4.0%), stomach (3.7%), oesophagus (3.2%) and colon-rectal-anal canal (3.0%). Registry had documented cancers identified from about 50 different sites in body and from among them the most commonly prevalent had been mentioned above (Table 2).

Methods of diagnosis

Different methods were used to diagnose cancer when the patient approaches the health facility. The most commonly used diagnostic techniques for diagnosis of cancers were microscopy (which includes histology, cytology, blood films, bone marrow study etc.), X-ray / imaging techniques and clinical assessment. Microscopy was the most common diagnostic method used to diagnose 82.44% of the patients, followed by X-ray /

imaging techniques (8.39%). Clinically, the diagnosis was done in 7.78% patients. X-ray / imaging method are used more among the male patients (62.70%) when compared to the female patients (37.30%) (Table 3).

Table 2: Top cancers by site of origin among male and
female patients (2007-2010).

Common	Male		Common	Female	
cancer sites among males	No	%	cancer sites among females	No	%
Stomach	1446	9.2	Cervix Uteri	4462	25.5
Lungs	1404	8.9	Breast	3921	22.4
Mouth	1351	8,6	Ovary	921	5.3
Pharynx	1193	7.6	Mouth	914	5.2
Leukaemias	1165	7.4	Leukaemias	710	4.0
Tongue	1061	6.7	Stomach	645	3.7
Oesophagus	892	5.7	Oesophagus	599	3.2
Colon-rectal- anal canal	823	5.2	Colon-rectal- anal canal	531	3.0
Non- Hodgkin's lymphomas	655	4.2	Thyroid	467	2.7
Other sites	5741	36.5	Other sites	4329	25.0
Total	15731	100	Total	17499	100

(Cancers have been identified from about 50 different sites in the body)

Table 3: Method of diagnosis of cancers for all sites(2007-2010).

Method of	Male patients		Female patients		Total	
ulagilosis	No	%	No	%	No	%
Microscopy	12422	45.34	14973	54.66	27395	82.44
X-ray / imaging	1748	62.70	1040	37.30	2788	8.39
Clinical	1258	48.65	1328	51.35	2586	7.78
Others	303	65.73	158	34.27	461	1.39
Total	15731	47.34	17499	52.66	33230	100.0

(Microscopy = Histology, cytology, blood films, bone marrow study and other methods)

Treatment methods used

The most common treatment procedure of choice for most of the patients was combination of radiotherapy and chemotherapy (28.56%). This is followed by chemotherapy alone (20.00%) and radiotherapy alone (11.86%). Surgery alone was the treatment of choice for about 8.62% patients while a combination of surgery + chemotherapy + radiotherapy was given to 7.79% of patients. Among 825 patients who received combination therapy of surgery + chemotherapy + radiotherapy, about 73.82% were female patients and about an average 60% of those who received combination of radiotherapy + chemotherapy and surgery + chemotherapy and radiotherapy alone were female patients (Table 4).

Table 4: Type of treatment procedures used for allsite cancers only at the regional institute (2007-2010)(excluding the cancers previously treated).

Type of	Male		Femal	e	Total	
treatment used	No	%	No	%	No	%
Surgery [S]	527	57.72	386	42.28	913	8.62
Radiotherapy [R]	492	39.14	765	60.86	1257	11.86
Chemotherapy [C]	1211	57.15	908	42.85	2119	20.00
S+R	163	43.82	209	56.18	372	3.51
S+C	192	36.57	333	63.43	525	4.95
R+C	1176	38.86	1850	61.14	3026	28.56
S+R+C	216	26.18	609	73.82	825	7.79
Others	137	8.78	1423	91.22	1560	14.72
Total	4114	38.82	6483	61.18	10597	100.00

Among those who underwent surgery or radiotherapy treatment, about 57.72% were male patients while among those received combination therapy of surgery + radiotherapy, 43.82% were male patients. The data shows that radical treatment was the most favored treatment adopted by institutions to treat patients with different type of cancers. Nearly 89.93% of the patients underwent radical treatment while only 10.07% were considered for palliative treatment. Among them about 60% were female patients (Table 5).

Table 5: Method of treatment adopted by institutionsto treat cancers (2007-2010) (excluding the cancerspreviously treated).

Method of	Male		Female		Total	
treatment adopted	No	%	No	%	No	%
Radical treatment	3679	38.60	5851	61.40	9530	89.93
Palliative treatment	435	40.76	632	59.23	1067	10.07
Total	4114	38.82	6483	61.18	10597	100

Marital status and cancer

Cancers of different types were found to be very high among married men and women. Among the 15731 cancer affected male patients, 86.5% were married while only 10.6% were unmarried. Among the 17499 cancer affected female patients, 72.6% were married when compared to unmarried women (4.9%) while 21.2% affected were widows.

Mortality due to cancers

The data released for the three years from 2006 to 2008 shows the mortality pattern among the cancer affected

patients in relation to age group and sex. The mortality rate increases as the age advances. Cancer patients above 60 years of age showed the highest mortality rate of 46.28% followed by 40.91% belonging to the age group of 40-59 years. Thus about 87% of mortality among cancer affected patients is seen in the age group above 40 years while among children and adolescents the mortality rate was only 3.32%. Overall mortality rate among males is higher (54.52%) when compared to females (45.48%) (Table 6).

Table 6: Age group and sex wise mortality due to
cancers in Chennai (2006-2008)*.

Age	Male		Femal	e	Total	
group	No	%	No	%	No	%
0-19	73	58.87	51	41.13	124	3.32
20-39	171	48.17	184	51.83	355	9.49
40-59	790	51.63	740	48.37	1530	40.91
>60	1005	58.06	726	41.94	1731	46.28
Total	2039	54.52	1701	45.48	3740	100.00

*Mortality data available only from 2006 to 2008 period

Case fatality rate due to cancers

The overall case fatality due to cancers for the years 2006-2008 shows that out of 15258 cancer patients registered, 3740 (24.51%) patients died. Among the males cancer patients, 27.58% died while among female cancer patients, 21.62 % died. This data also shows that mortality among male patients was more when compared to female patients (Table 7).

Table 7: Case fatality rate due to cancers in Chennai(2006-2008)*.

Gender	Incidence	Mortality	Case fatality rate (%)
Male	7392	2039	27.58 %
Female	7866	1701	21.62 %
Total	15258	3740	24.51%

*Mortality data available only from 2006 to 2008 period

DISCUSSION

Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body. There are over 100 different known cancers that affect humans. Most cancers are named for the organ or type of cell in which they start - for example, cancer that begins in the colon is called colon cancer; cancer that begins in melanocytes of the skin is called melanoma. Cancers figure among the leading causes of death worldwide, accounting for 8.2 million deaths in 2012. Lung, liver, stomach, colorectal and breast cancers cause the most cancer deaths each year. The most frequent types of cancer differ between men and women. $^{11} \ensuremath{^{11}}$

Population ageing is often assumed to be the main factor driving increases in cancer incidence, death rates, and health-care costs.² Cancer is a major cause of morbidity and mortality in developing and developed countries alike. In many low-income and middle-income countries, including India, most of the population does not have access to a well-organized and well regulated cancer care system.¹² The National Cancer Registry Programme (NCRP, established by the Indian Council of Medical Research in 1981) provides population-based data from a selected network of 28 cancer registries located across the country.¹³

This review shows that the young and the old among the males have more incidence of cancer while the middle aged women have more incidence of cancer. The data from the registry shows that as age advances the incidence of cancer also increases. The incidence is more above the age of 40 years contributing to nearly 70% of the cancer patients reported. The least reported incidence was found among the less than 10 year age group. Among the male patients, cancer of Stomach is the leading site followed closely by Ca lungs while among the female patients, cancer of cervix-uteri and Ca breast were the predominant cancer sites.

A study conducted by Mohandas KM et al. based on all India statistics shows that Indian men were mostly suffering from oral, lung, stomach, colorectal, pharyngeal, and esophageal cancers while among the females, incidence of breast, cervical, and colorectal cancers are more marked. In women, breast cancer is the most common cause of cancer deaths, and the most frequently diagnosed cancer, accounting for more than 1 in 5 of all deaths from cancer in women. In men, the more common cancers are tobacco-related. For Indian women, cervical cancer is the second most common incident cancer.¹² About 40% of all cancers in India are attributable to tobacco.

The most commonly used diagnostic techniques for diagnosis of cancers were predominantly based on microscopy which includes histology, cytology, blood films, bone marrow study etc. The combination of radiotherapy and chemotherapy was the most common treatment procedure of choice for most of the patients which was followed by chemotherapy alone and radiotherapy alone. Surgery was also used as the treatment of choice for sizeable patients. Nearly 90% of the patients underwent radical treatment while only 10% were considered for palliative treatment. Among the male patients, 86.5% were married while among the female patients, 72.6% were married.

The review also shows that the mortality rate increases as the age advances. Cancer patients above 60 years of age showed the highest mortality rate. Mortality among cancer patients was very high in the age group above 40 years while among children and adolescents the mortality rate was very less. Overall mortality rate among males was higher when compared to females.

The overall case fatality rate due to cancer was about 25% as per the data available. Mohandas KM et.al describes that the overall cancer mortality rate in India is relatively high, at 68% of the annual incidence. This indicates that fewer than 30% of Indian patients with cancer survive 5 years or longer after diagnosis. Since there are limitations in the available data, the true proportion could be significantly lower.¹²

In India, quantifying the burden also faces other barriers: people may not recognize the signs of cancer, or not have the resources to go to a medical facility. Once at a clinic or hospital, lack of resources or medical equipment may mean the diagnosis is not made at the right time. Even when cancer is recognized, the family may lack the funds to pursue treatment and decide to abandon therapy before the patient is registered.

According to an earlier research in India, the three leading causes of cancer death in men aged 30-69 years were lung cancer (including larynx and trachea), oral cancer (including pharynx and lip) and stomach cancer. For women aged 30-69 years, the three most common fatal cancers were breast cancer, cervical cancer and stomach cancer. They also concluded that "Prevention of tobacco-related and cervical cancers and earlier detection of treatable cancers would reduce cancer deaths in India", particularly in the rural areas that are underserved by cancer services.

The substantial variation in cancer rates in India suggests other risk factors or causative agents that remain to be discovered. The fact that 71% of cancer deaths occur in those aged 30-69 years emphasizes the substantial social and economic gains that would be associated with a successful cancer prevention program. Interventions such as tobacco control, vaccination against human papilloma virus and hepatitis B, cervical cancer screening, and early detection and treatment of oral and breast cancers would have a substantial effect on the prevention of cancer deaths.¹⁴

To sum up, cancer has become a major killer disease in the country now. Deaths due to cancers are high among males and females and also among all age group affected with it. The overall case fatality rate due to cancer in Chennai was found to be about 25% which is very high. Mostly the affected patients report to the hospitals in an advanced stage of the disease. Hence it will be too late to receive a possible treatment/cure in spite of the best effort. Regular cancer screening and early detection of cancer is still a long way to go. There are only limited numbers of specialized hospitals, specialists and trained man power available to tackle this problem in India at present.

CANCER IS PREVENTABLE

About 30% of cancer deaths are due to the five leading behavioral and dietary risks: high body mass index, low fruit and vegetable intake, lack of physical activity, excessive use of tobacco and alcohol.¹¹ From epidemiological studies, it is clear that 70-90% reasons of developing cancer are related to environment and to the lifestyle of a person. So, to a great extent, it is preventable.³

Heredity also plays its role in causing cancer, which accounts for just five percent of cancer cases while the rest is caused by non-heredity factors such as lifestyle, food we eat, level of physical activity, personal hygiene, etc.

As per expert's opinion, all the major forms of cancers are preventable. Cervical cancer can be fully prevented with creating awareness among young women. Oral cancer can be prevented by not using tobacco and drinking alcohol. By avoiding very spicy and hot food it is possible to prevent the risk of developing esophageal and stomach cancer. Regular exercise, for at least 30 minutes in a day is necessary for leading a healthy lifestyle, which will also contribute to prevention of diseases like cancers.⁵

Thus now more emphasis should be given to popularize the methods and lifestyle modifications which will help to prevent cancer in the long run.

National cancer control program

The national cancer control program was launched in 1975-76 with the main objectives of prevention, early diagnosis and treatment of cancers. In view of the magnitude of the problem and gaps in the availability of cancer treatment facilities in the country, the program was revised in 1984-85 and during 2004.¹⁵ The main objectives of the program are:

- Primary prevention of cancers by imparting health education
- Secondary prevention i.e. early diagnosis of common cancers such as cancer cervix, mouth, breast and tobacco related cancers by screening/selfexamination methods
- Tertiary prevention i.e. strengthening of the existing tertiary care institutions of comprehensive therapy including palliative care in terminal stage of cancer.
- Training of adequate man power to meet the cancer control activities.

The National Cancer Control Program has now been integrated with Diabetes, Cardiovascular diseases and Stroke from the year 2011.

SUMMARY

Most of the cancers are amenable to primary and primordial prevention and can be prevented and controlled to a large extent. Health education and awareness creation about the warning signs for cancer must be highlighted and periodic screening must he popularized among the communities. The public sector alone may not be able to meet all the challenges posed by cancer in India. It is necessary to have a proper public private partnership to invest heavily on latest technology for cancer screening and therapy which will help to overcome the burden of cancer in the long run.

There is strong need to make cancer a notifiable disease which may help to improve the assessments of the regional and national cancer burden. There needs to establish more number of new and improved cancer registries covering the uncovered regions so far. Public health initiatives directed at providing better living conditions in cities and villages, proper drainage and protected water supply, appropriate immunizations, preventing pollutions at all levels, advocating healthy life style by improving nutrition status of the vulnerable groups, provide exercise space for prevention of obesity and better working environment etc. will help to slow the increase in lifestyle-associated cancers.

More cancer research initiatives are needed to understand the epidemiological trends happening in our country which will help to plan and focus on programs to tackle this menace. Our health care delivery systems at the primary, secondary and tertiary care levels should be strengthened to meet the challenges posed by the spectrum of cancer diseases. All these actions are time consuming and need strong political will but will have a long term beneficial effect not only for reducing cancer but also for the entire diseases burden in our country.

Funding: No funding sources Conflict of interest: None declared Ethical approval: Not required

REFERENCES

- 1. Marimuthu P. Projection of cancer incidence in five cities and cancer mortality in India. Indian J Cancer. 2008;45(1):4-7.
- 2. Yancik R. Population aging and cancer: a crossnational concern. Cancer J. 2005;11(6):437-41.
- 3. Varghese C. 50 years of cancer control in India. In: Varghese C, eds. Cancer Prevention and Control in

India. New Delhi: MoHFW, Government of India; 2002: 48-59.

- 4. Imran A, Waseem AW, Kishwar S. Cancer scenario in India with future perspectives. Cancer Ther. 2011;8:56-70.
- Kaur R. Rising cases of cancer in India. My India, 2013. Available at: http://www.mapsofindia.com/my-india/india/risingcases-of-cancer-in-india. Accessed 20 September 2014.
- 6. World Health Organization. World cancer report. Media centre News releases, 2003. Available at: http://www.who.int/mediacentre/news/releases/2003 /pr27/en/. Accessed 20 August 2014.
- 7. Parkin DM. The evolution of the population-based cancer registry. Nat Rev Cancer. 2006;6:603-12.
- 8. Young JL. The hospital-based cancer registry. In: Young JL, eds. Cancer Registration: Principles and Methods. Lyon (France): IARC; 1991: 177-184.
- 9. Shanta V, Swaminathan R. Population based cancer registry, Chennai. In: Shanta V, Swaminathan R, eds. Individual Registry Data. Adyar, Chennai: Cancer Institute (WIA); 2009.
- Shanta V, Swaminathan R, Rama R. Hospital based cancer registry, Chennai. In: Shanta V, Swaminathan R, eds. Individual Registry Data. Adyar, Chennai: Cancer Institute (WIA); 2007-2010.
- 11. WHO. Cancer fact sheet N°297, 2014. Available at: http://www.who.int/mediacentre/factsheets/fs297/en /. Accessed 21 September 2014.
- Mallath MK, Taylor DG, Badwe RA, Rath GK, Shanta V, Pramesh CS, et al. The growing burden of cancer in India: epidemiology and social context. Lancet Oncol. 2014;15(6):e205-12.
- Ncrpindia.org. National cancer registry programme, 2014. Available at: http://www.ncrpindia.org/. Accessed 19 September 2014.
- Dikshit R, Gupta P, Ramasundarahettige C, Gajalakshmi V, Aleksandrowicz L, Badwe R, et al. Cancer mortality in India: a nationally representative survey. Lancet. 2012;379(9828):1807-16.
- Park K. Health programmes in India. In: Park K, eds. Text Book of Preventive and Social Medicine. 21st ed. Jabalpur, India: M/s Banarsidas Bhanot; 2011: 415.

DOI: 10.5455/2394-6040.ijcmph20150202 **Cite this article as:** Gopalakrishnan S, Umadevi R. An epidemiological analysis of cancer patients admitted to hospitals in Chennai, Tamil Nadu. Int J Community Med Public Health 2015;2:3-9.