RESEARCH ARTICLE

Estimation of Time Trends of Incidence of Prostate Cancer – an Indian Scenario

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Abstract

Background: With increase in life expectancy, adoption of newer lifestyles and screening using prostate specific antigen (PSA), the incidence of prostate cancer is on rise. Globally prostate cancer is the second most frequently diagnosed cancer and sixth leading cause of cancer death in men. The present communication makes an attempt to analyze the time trends in incidence for different age groups of the Indian population reported in different Indian registries using relative difference and regression approaches. Materials and Methods: The data published in Cancer Incidence in Five Continents for various Indian registries for different periods and/or publications by the individual registries served as the source materials. Trends were estimated by computing the mean annual percentage change (MAPC) in the incidence rates using the relative difference between two time periods (latest and oldest) and also by estimation of annual percentage change (EAPC) by the Poisson regression model. Results: Age adjusted incidence rates (AAR) of prostate cancer for the period 2005-2008 ranged from 0.8 (Manipur state excluding Imphal west) to 10.9 (Delhi) per 10^5 person-years. Age specific incidence rates (ASIR) increased in all PBCRs especially after 55 years showing a peak incidence at +65 years clearly indicating that prostate cancer is a cancer of the elderly. MAPC in crude incidence rate(CR) ranged from 0.14 (Ahmedabad) to 8.6 (Chennai) . Chennai also recorded the highest MAPC of 5.66 in ASIR in the age group of 65+. Estimated annual percentage change (EAPC) in the AAR ranged from 0.8-5.8 among the three registries. Increase in trend was seen in the 55-64 year age group cohort in many registries and in the 35-44 age group in Metropolitan cities such as Delhi and Mumbai. Conclusions: Several Indian registries have revealed an increasing trend in the incidence of prostate cancer and the mean annual percentage change has ranged from 0.14-8.6.

Keywords: Time trends - incidence - prostate cancer - Indian cancer registries

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Introduction

Globally, prostate cancer is the second most frequently diagnosed cancer in men (13.6% of the total) and the fifth most common cancer overall (Ferlay et al., 2010). In 2008, an estimated 4.04 million years of healthy life is lost globally because of prostate cancer alone. Prostate cancer is the most prevalent of all the cancers among men with its occurrence in 111 countries worldwide in 2008 (IARC and Cancer Research 2012). It is the sixth leading cause of cancer death in men (6.1% of the total) (Garcia et al., 2007; Ferlay et al., 2010). Globally the largest proportionate increase in new cancer cases by 2020 is projected for Prostate cancer. Case fatality rate in low income countries (78.6%) is 3.5 times that of high income countries (22.5%) (Beaulieu et al., 2009). Prostate cancer is primarily a disease of the elderly men with three quarter of cases occuring in men aged 65 years and above.

Prostate cancer has become a major health problem in industrialized world during the last decades of the 20th century contributing to three fourth of the registered cases across the globe (Perin et al., 2001). Incidence rates of Prostate cancer vary by more than 25 fold worldwide, the highest rates being in Australia/ New Zealand (104.2/100,000), Western and Northern Europe, North America, largely because the practice of PSA has become widespread in those regions. Incidence is relatively high in certain developing regions too, such as the Caribbean, Sub Saharan African countries. Incidence rates of Prostate cancer are low in Asian and North African countries, ranging from 1-9/100,000 persons (Perin et al., 2001). Demographic and epidemiological transitions in developing countries like India have shown an increasing trend in burden of non communicable diseases like cardiovascular disease, diabetes as well as cancer. While incidence rates for oral and esophageal cancers are some of the highest in the world, the rates for rectal, prostate and lung cancers are one of the lowest (Sinha et al., 2003).

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Although cancer rates in India are lower than those seen in Western countries, increasing life expectancy and adoption of newer lifestyles are bringing about an increase in the rates. The estimated Age Adjusted-incidence Rates (AAR) of Prostate cancer in India was 3.7 per 10^5 persons during the year 2008 (Ferlay et al., 2010). Projected cases at all India level for Prostate cancer for the period 2010; 2015 and 2020 was estimated at 26,120; 28,079 and 30,185 (NCRP, 2009)

With the current scenario, a systematic cancer trend analysis will help to understand the changing risk of cancer in population and also help in making future projections of cancer occurrence. This in turn will help the health care delivery system to plan and formulate sound cancer control strategies based on scientific and empirical basis. The present communication makes an attempt to analyze the time trends of Prostate cancer incidence for different age groups of Indian population reported in different Indian registries using relative difference and regression approach.

Materials and Methods

Incidence rates (age-adjusted to the world-standard population, crude rate, as well as age specific) for Prostate cancer between 1968 and 2002 were obtained from the volumes III-IX of Cancer Incidence in Five Continents (CI5) (Waterhouse et al., 1976; Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; Parkin et al., 1997; Parkin et al., 2002; Curado et al., 2007). The CI5 included incidence data reported by the Indian Population Based Cancer Registries (PBCRs) covering areas- Ahmedabad, Bangalore, Chennai, Delhi, Mumbai, Karunagapalli, Nagpur, Pune and Thiruvananthapuram (Trivandrum). Volumes III-IX generally provided data for 5-year time periods 1968-72, 1973-77, 1978-82, 1983-87, 1988-92, 1993-97 and 1998-02 respectively. The Bangalore data for 1998-2002 and data for other registries (Bangalore, Bhopal, Barshi, Chennai, Mumbai, Delhi, 2004-05; Kolkata 2005; North Eastern registries, 2005-06; Ahmedabad-rural 2005; Nagpur, Pune and Aurangabad data for 2001) were obtained from the individual registry publications or from the reports of the National Cancer Registry Programme (NCRP) of Indian Council of Medical Research (ICMR) (NCRP 2008; Indian Cancer Society, 2007; Kidwai Memorial Institute of Oncology, 2004, 2005).

A uniform pattern of recording and information collection on a standard proforma is being followed by all the Indian PBCRs. In all the Indian registries, cases are coded according to International Classification of Diseases for Oncology (ICD-10) (WHO, 2000). The registries routinely undertake various exercises to ensure that the data they gather are of high quality. The coordinating unit of the registries undertakes an extensive check for duplicates. The commonly used indices are: proportion of cases with microscopic verification of diagnosis, proportion of cases based on death certificate only and mortality by incidence ratio. The microscopic verification of diagnosis has been generally good in all the Indian PBCRs during all the time periods (Waterhouse et al., 1976; 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007). As per the published report of 2008 of the PBCRs, the proportion of cancer cases based on microscopic verification ranged from 79-88.3% in various registries used for trend analysis. However, the diagnosis based on X-ray examination varied from 0.6-12.5% (NCRP, 2008). Hence the data is considered highly reliable and complete (Waterhouse et al., 1976; Waterhouse et al., 1982; Muir et al., 1987; Parkin et al., 1992; 1997; 2002; Curado et al., 2007; WHO, 2000). In all the Indian registries, cases are coded according to International Classification of Diseases for Oncology (ICD-10) (WHO, 2000).

Although there are many PBCRs operational in India, data was analysed for different periods based on the year of commencement of registry and completeness of available data. Continuous data was available from 1968-2002 for Bombay (Mumbai) registry, the Bangalore and Chennai registries provided data for four successive 5-year calendar periods from 1983-2002, as they were established during the year 1982. Although the Nagpur and Pune registries had data for a long term, data was missing for some in-between 5 year periods. Delhi registry provided data for three successive 5-year periods (i.e 1988-92;1993-97 and 1998-2002) while limited data was available from Ahmedabad registry.

The trend component was studied by calculating (i) Mean annual percentage change in the crude, age-adjusted and age-specific incidence rates of Prostate cancer by relative difference method and (ii) Estimated annual percent change calculated using regression approach.

(i) Mean annual percentage change in crude, age-adjusted or age-specific incidence rates by relative difference method: In this approach, the trend component has been obtained according to (i) 5-year calendar period and by (ii) considering age of the person along with the calendar period. Data for Bangalore and Chennai relate to periods from 1983-87 to 1998-2002, while the data for Mumbai relate to the periods from 1968-72 to 1998-2002. Similarly, the data for Nagpur relate to periods 1980-82 to 1998-2002 and for Pune from 1973-77 to 1998-2002; for Ahmedabad from 1983-87 to 1993-97; and for Delhi from 1988-92 to 1998-2002. Barshi, Karunagapalli and Thiruvananthapuram (Trivandrum) registries were not considered for trend analysis as data for 5-year periods consisted of only two such periods.

Measures of trend over time period have been estimated as overall or Mean Annual Percentage Change (MAPC) in Crude Incidence Rates (CR), Age-adjusted incidence rate (AAR) and Age-specific incidence rates (ASIR) by taking (i) relative difference in the incidence rates between latest-time (period t) with further-most period (base-line period t_0) and (ii) dividing this difference by the product of the number of years covered between the two time periods and the baseline period incidence rate. Further this quotient was expressed as a percentage. Mathematically expressed as MAPC (%)= [(Incidence rate at latest time period t - Incidence rate at base-line period t_0)/ (Incidence rate at base-line period t_0 * number of actual years covered between the two time periods)]*100. The pooled ASIR were estimated for the age groups 15-34,

35-44, 45-54, 55-64 and above 65+ years to obtain more stabilized incidence rates.

ii) Estimated annual percent change (EAPC) using regression model approach: Annual percent changes in incidence rates of cancer in each age group were estimated by means of a log-linear regression model assuming that the response variable has a Poisson distribution through the Maximum Likelihood Procedure. The logarithm of the respective incidence rates on the midpoint of the five-year time period was considered. The mathematical expression was of the form: [i.e. $\log_e$ (incidence rate)=$\alpha_0+\alpha_1 a+\beta y$]; where a: age, y: year of diagnosis, α_0, is a constant, α_1 and β are regression coefficients. The coefficients including the average annual change in incidence rate was calculated from the maximum likelihood estimate of the parameter for the year of diagnosis (β). Further, estimation of annual percent change (EAPC) was done as EAPC=100*(e^{β}-1). This change was regarded as statistically significant if the P-value was less than or equal to 0.05. For the purpose of uniformity and comparison, published data from Mumbai, Chennai and Bangalore was employed for the five periods from 1983-2002.

Satisfactory fit in terms of a linear model was obtained with a Poisson error distribution for the number of incident cases. Separate analysis was performed with age term being retained in the model.

The regression analysis was done using SAS version 8.1., while the rest of the analysis was done employing Microsoft excel.

Results

Age-adjusted incidence rate (AAR) of Prostate cancer in various registries

The AAR of Prostate cancer for various period during 2005-2008 ranged from 0.8 (Manipur state excluding Imphal west) to 10.9 (Delhi) per 10^5 person-years. Thiruvananthapuram, Pune, Mumbai, Kamrup urban and Bangalore had high AAR in the range of 7.2-8.9 per 10^5 person-years, whereas some registries in the North Eastern region of India (Dibugarh, Imphal west, Mizoram, Manipur, Sikkim and Silchar), Barshi and Ahmadabad rural showed lower AAR below 3 per 10^5 person-years. Relative proportion of Prostate cancer to all cancers ranged from 1.1-8.3. Highest proportion was seen in Pune (8.3), Kolkota (7.4), Delhi (7.0), Bangalore (6.6) and Mumbai (6.4).

Table 1. Age Specific Incidence Rates of Prostate cancer Per 100,000 person-years by Broad Age Groups in the Earlier Established Indian Registries

Age in years	Bangalore (2006-07)	Chennai (2006-08)	Delhi (2006-08)	Mumbai (2006-07)	Nagpur (2005-07)	Pune (2006-08)
15-34	0	0	0.07	0.01	0	0.03
35-44	0.28	0.09	0.27	0.22	0.38	0.10
45-54	0.41	0.37	1.00	0.32	0.87	1.87
55-64	16.12	11.60	26.64	16.19	8.97	15.70
65+	107.38	51.56	118.59	83.96	37.04	87.05

Age specific incidence rates (ASIR) of Prostate cancer per 10^5 person-years

The ASIR of Prostate cancer for seven registries for various periods during 2005-2008 in broad age groups was considered for comparison (Table 1). It was observed that incidence of Prostate cancer was very low in younger age group (<55 years) and uniformly, ASIR increased with increasing age groups in all PBCRs especially after 55 years. Peak incidence was observed at +65 years clearly indicates that Prostate cancer is a cancer of elderly men. The comparative assessment of age-specific incidence-rates in various registries showed varied results ranging from as low as 37.04 (Nagpur) to 118.59 (Delhi) per 10^5 person-years in +65 years age group.

Time trends in occurrence of Prostate cancer

Period effect (Table 2): Although there are several population-based registries operating in the country, data for sufficient duration enabling study of time trends was available only for Mumbai and six other registries which was considered for analysis.

In Mumbai registry, the annual age-adjusted incidence rate which was 7.28 during the year 1968-72 decreased to 6.90 per 10^5 person-years during the years 1998-02 but

Table 3. Estimated Annual Percentage Change (EAPC) in the incidence rates of Prostate cancer in different age group during the years 1983-2002

Age (in years)	Mumbai		Chennai		Bangalore	
	EAPC (%)	P value	EAPC (%)	P value	EAPC (%)	P value
50-54	-1.35	0.39	-	-	-	-
55-59	1.38	0.13	1.24	0.55	-	-
60-64	1.05	0.25	5.51	0.001	-0.02	0.99
65-69	0.25	0.74	5.06	0.001	0.98	0.55
70-74	0.28	0.63	7.11	0.001	4.01	0.01
75+	1.5	0.03	8.5	0.001	3.78	0.001
CR	2.8	0.001	7.61	0.001	2.85	0.001
AAR	0.79	0.04	5.75	0.001	2.05	0.01

Table 2. Trends in Crude Incidence Rates (CR) and Age Adjusted Incidence Rates (AAR) per 100,000 person-years in various registries by calendar year and mean annual per-cent change (MAPC) between the earliest and lastest period: Prostate cancer

Period	Ahmedabad		Bangalore		Chennai		Delhi		Mumbai		Nagpur		Pune	
	CR	AAR	CR	AAR	CR	AAR	CR	AAR	CR	AAR	CR	AAR	CR	AAR
1968-72	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1.83	7.28	N.A.	N.A.	N.A.	N.A.
1973-77	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1.74	6.80	N.A.	N.A.	2.23	6.20
1978-82	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1.83	8.20	2.90	4.80	1.91	4.80
1983-87	1.82	4.10	2.23	4.80	1.11	2.10	N.A.	N.A.	2.45	6.90	N.A.	N.A.	N.A.	N.A.
1988-92	N.A.	N.A.	2.75	4.73	1.82	3.61	2.7	6.0	2.86	7.95	N.A.	N.A.	N.A.	N.A.
1993-97	1.86	3.58	2.16	3.81	3.12	4.85	3.1	6.6	3.25	7.42	2.13	3.43	3.32	6.62
1998-02	N.A.	N.A.	3.40	6.00	3.00	3.90	3.9	8.2	3.70	6.90	2.10	3.00	3.70	6.40
MAPC (%)	0.14	-0.85	2.64	1.25	8.55	4.29	3.0	2.4	2.92	-0.15	-1.20	-1.63	2.20	0.11

was more or less constant through the years accounting for MAPC of -0.15%. However, the CR showed an increase in incidence of Prostate cancer over the years from 1.83 in 1968-72 to 3.70 in 1998-02 per 10^5 male populations and the MAPC was found to be 2.92%. Increase in MAPC was seen in Bangalore (CR=2.64%, AAR=1.25%), Chennai (CR=8.55%, AAR=4.29%), Delhi (CR=3.0%, AAR=2.4%) and Pune (CR=2.20%, AAR=0.11%), while MAPC for AAR showed decreasing trend in Ahmedabad (AAR=-0.85%), Nagpur (AAR=-1.63%) and Mumbai (AAR=-0.15%). It can be observed that MAPC in CR and AAR was highest in Chennai, while decreasing trend was observed in both CR and AAR in Nagpur.

Age and period wise effect on incidence rates: To study the combined effect of age and period, using ASIR of Prostate cancer by broad age groups of 15-34, 35-44, 45-54, 55-64 and 65+ and by period, the relative increase of MAPC% between the first and last time period within each age group was calculated. Except for Ahmedabad and Nagpur, in all other registries, the ASIR by period revealed an increase in the incidence of the disease in age group of +65 years and the MAPC ranged from 0.38% (Mumbai) to 5.66% (Chennai). Furthermore, Ahmedabad and Nagpur showed decrease in MAPC in all age groups except for in 55-64 years age group and similarly Pune showed decrease in MAPC in all age groups except for 45-54 years and +65 years age group. Bangalore registry revealed decrease in MAPC in all age intervals except in +65 years age group. Among all the registries, Chennai recorded the highest MAPC of 2.99 and 5.66, followed by Delhi with MAPC of 2.55 and 2.66 in the age group of 55-64 and 65+ respectively.

Estimated annual percentage change (EAPC) in incidence through regression analysis (Table 3): EAPC was attempted for the data of three earlier established PBCRs viz. Mumbai, Chennai and Bangalore for the period 1983-2002 between the period and incidence rates for (i) each of the 5 year age specific incidence rates (0-4, 5-9,…..=>75) (ii) CR and (iii) AAR. But however, since the incidence rate was very low among the <50 years age group population, the regression rates for that age group was not attempted. Except for Mumbai, the analysis of EAPC could not be done for some five year age intervals for Chennai and Bangalore registry as there was limited number of cases in these age groups.

Results of analysis of EAPC revealed that for most of the age groups, linear regression was found to be a satisfactory fit between period and incidence rate as noted through the deviance/df values. When different 5 year age-wise incidence rates were considered, no consistent pattern was noted except for in Chennai registry where EAPC was found to be significant in all five year age groups starting from 60-64 years onwards. EAPC was found to be significant among 75+ age group in Mumbai; 70-74 and 75+ age group in Bangalore registry.

As regards to CR and AAR, EAPC was found to be statistically significant in all the three registries. The estimated annual percentage change ranged from 2.80-7.61%, and 0.79-5.75% in CR and AAR respectively amongst the three registries (P value=0.001-0.04).

Discussion

In the present communication, time trends of Prostate cancer incidence have been examined using the data provided by various Indian PBCRs established in the country. In general, trends in the incidence of cancer may vary due to various factors such as initiation of screening programme, changes in diagnostic methods, completeness and reliability of data, changing profile of risk factors in the population, or as a consequence of better health awareness.

Modeling of the data through age, birth cohort and calendar time period are the appropriate techniques for analyzing trends in cancer. However, the above approach could not be adopted in the present analysis, as the data was not available for a sufficiently long period of time from various registries other than Mumbai. Hence, mean annual percent change in the age-adjusted and age-specific incidence rate in Prostate cancer was computed between the earliest and latest time periods to evaluate the change over the time period. In addition to the above, trends in annual percentage change in Prostate cancer were estimated by employing a Poisson regression model. Trends were computed for crude; age adjusted and age specific incidence rates at various five year age intervals from the data of three registries viz. Mumbai, Chennai and Bangalore. For the present study, only microscopically incident cases of Prostate cancer registered in various PBCRs were included and as such misclassification of cases is unlikely. In the present trend analysis, wide variation was noticed in the incidence (AAR) of the Prostate cancer amongst the various Indian Registries ranging from 0.8-10.9. Highest AAR was noted in some of the metropolitan cities of India such as Delhi (10.9), Bangalore (8.9), Mumbai (7.5), Pune (7.5) and in some of the north eastern regional registries including the eastern India of Kolkata. Wide variations in the age adjusted incidence rates of Prostate cancer is seen in different parts of world and in India the rates are only one tenth of that seen in the western countries (Ferlay et al., 2001). The possible reasons for observing varied incidence rates could be due to large differences in dietary practices and life style practices such as tobacco and alcohol consumption among Indian population across the country. It has been reported that total fat, saturated/ animal fat, meat and dairy products to be possible risk factors, while adequate consumption of vegetables as possible risk modifiers for Prostate cancer (Ray et al., 2010).

In our trend analysis, the age specific incidence rates were found to be highest in the older age groups and increasing trend was observed with increasing age in all the registries. Age has been reported to be an important risk factor for Prostate cancer and incidence has shown dramatical increase with age (Sunny, 2005). Study carried out on international trends in Prostate cancer rates also has reported that ASIR was extremely low for men younger than age of 50 and increased exponentially with advancing age and reached maximum after age 80 (Ann et al., 2000).

In the present study, trend analysis based on MAPC between two time periods revealed a steady increase in crude rate of Prostate cancer in many registries excepting

for Nagpur. Increase in AAR was observed in all registries ranging from 0.11 (Pune) to 4.29 (Chennai) except in Nagpur, Mumbai and Ahmedabad where decrease in AAR was observed. Similarly, statistically significant increase in the incidence of Prostate cancer was observed with annual percentage change calculated based on joint point regression model varying from 0.8 in Mumbai to 4.7 in Chennai among four PBCRs located at Bangalore, Chennai, Delhi and Mumbai (NCRP, 2009). Annual rate of change reported by ICMR was almost similar in the studied registries except for Mumbai where negative rate of change was observed in our study while positive in their study. This difference could be due to consideration of all the years from 1982-2005 for regression analysis by ICMR whereas in our study, the first (1968-72) and the last five-year period (1998-02) has been considered. Study carried out using Mumbai cancer registry data for the period 1968-72 to 1998-2002 through age-period modeling technique has also shown a decrease in AAR from 72.8-63.9 per 10^5 populations (Yeole, 1997).

International trend analysis in Prostate cancer incidence carried out for 15 countries for 20 years between time period i.e. 1973-77 and 1988-92 has also revealed marked increase in Prostate cancer incidence in all the 15 countries including Asian countries except for India (Mumbai registry). Increase in rates ranged from 25-113%, 24-55% and 16-104% in high, middle and low risk countries respectively (Ann et al., 2000).

Further analysis of our data by age-specific incidence rates against period in the broad age-groups revealed an increase in MAPC in the age interval of above 65 years in all the registries except for Ahmedabad and Nagpur. Other than +65 years, in registries such as Ahmedabad, Chennai, Delhi and Mumbai, increased incidence in MAPC was seen in 55-64 year age group cohort also and in Metropolitan registries such as Delhi and Mumbai, increase was noted in 35-44 age groups. This indicates that there is tendency to develop cancer in younger age group possibly due to changing lifestyles including dietary factors. International observation also shows that the rates were generally higher for those younger than age 75 years which may due to westernization of the population (Ann et al., 2000).

Time trend analysis for Prostate cancer for age-adjusted incidence rate has been examined for the cities of Mumbai, Bangalore and Chennai for the period 1983-2002 based on the PBCRs data by employing joint point regression analysis (ICMR) (NCRP, 2009). Our findings by employing a Poisson regression model revealed statistically significant increase of EAPC both in CR and AAR in all the three registries. Highest EAPC was noted both in CR and AAR in Chennai registry (CR=7.61, AAR=5.75), while the Mumbai and Bangalore Registry revealed an increase of nearly 3% per annum in CR.

Globally, the largest proportionate increase (38%) in new cancer cases is projected for Prostate cancer (Beaulieu et al., 2009). It has been observed that in the USA, the incidence of Prostate cancer increased by 30% from 80 to 105 per 100,000 men during the period 1980-1988 and on an average by 20% per year from 1989-1992 (Hankey et al., 1999; Ries et al., 1999).Improvement in diagnostic practice could be the main reason for the observed increase in the Prostate cancer cases, particularly in North American men, where it accounts for 27% of new cases and 12% deaths from cancer (Ferlay et al., 2010). At the same time, the recent US data on trends has shown decline in not only the incidence of Prostate cancer since 1993 but also in mortality, which could be attributed to better treatment and perhaps diagnosis at earlier stage (Hankey et al., 1999; Howlader et al., 2012). But overall, PSA testing has a much greater effect on incidence than on mortality and there is less variation in mortality rates worldwide (10-fold) than is observed for incidence (25-fold).

The number of deaths from Prostate cancer is almost the same in developed and developing regions (Ferlay et al., 2010). Review on international trends and pattern of Prostate cancer have reported that there is large increase in incidence of Prostate cancer between 1975-1990 in low-risk countries such as China, Singapore, Japan, Hong Kong, where there is no screening programme for Prostate cancer (Hsing et al., 2000). By 2030, the developing world is expected to bear 70% of the global cancer burden (World Cancer Report, 2008).

With increase in population size and the proportion of elderly persons due to improved life expectancy, the absolute number of new cancer patients in India is increasing rapidly. It has been estimated that the incident number of Prostate cancer cases which was 17,415 in year 2001 would get increased to 27,215 by 2016 merely due to change in the size and structure of population (Murthy et al., 2008). In the country, Prostate cancer is one of the most common cancers amongst males and occupies 2nd-10th rank among cancers occurring in men during the year 2006-08 amongst various Indian registries (NCRP, 2010).

While only a few factors have been established as risk factors such as age, ethnicity, family history which are non-modifiable, there are other proposed modifiable risk factors such as dietary factors, consumption of non alcoholic beverages, vasectomy, obesity, benign prostatic hypertrophy and lack of physical activity which needs to be further validated. From many epidemiological studies, it has become very clear that there is environmental as well as genetic contributions to the development of Prostate cancer (Sunny, 2005).

While comparing incidence rates between high and low-risk populations, various factors that affect the reported incidence such as screening with prostate-specific antigen test, changes over time in diagnostics and population differences in access to medical care, quality of cancer diagnosis, and completeness and accuracy of cancer reporting have to be considered (Ann et al., 2001).

Based on trends data, that with growing population of elderly, there is every reason to believe that the burden of Prostate cancer will continue to grow not only in terms of the absolute number of cases but also in-terms of incidence. The present analysis suggests that probably changes in the diagnostic modalities, increased awareness and changing life style may be responsible for much of the observed change in incidence of prostate cancer. But further analytical studies are required to understand the increasing trends observed in prostate cancer in correlation to the above mentioned factors.

One of the limitations of the study is that the data from Indian cancer registries are mostly urban based and very small percentage of the data is from rural population. Hence, the current study reflects the urban situation of prostate cancer incidence in large.

In conclusion, higher incidence rates of prostate cancer have been observed in metropolitan cities and rural registries have shown a very low incidence rates. A clear period effect has been observed in many of the registries. Statistically significant increase in trends of both crude and age-adjusted rate were observed in Bangalore, Chennai and Mumbai over the period 1983-2002. Increase in incidence was noted in the elderly age groups. The observed change in incidence of prostate may be due changes in the prevalence of the etiological factors over time and adoption of westernized life style. Further studies are needed to better understanding of the etiology and prevention aspects of the prostate cancer.

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