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RESEARCH ARTICLE

EMERGING TRENDS IN EPIDEMIOLOGY OF PROSTATE CANCER IN INDIAN POPULATION

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ABSTRACT

The carcinoma of the Prostate has been known to be a major health burden in high income Western countries. However, with changes in lifestyle and increasing life expectancy, the incidence rate of Prostate cancer (PCa) is growing rapidly in India as well. Due to this increased incidence rate, Indian male population needs increased awareness for the disease. The established risk factors for PCa include advancing age, race, family history and dietary patterns. Several other lifestyle related attributes including sexual activity, obesity, smoking, vasectomy and smoking are also known to be associated with PCa risk in males. This mini review aims to shed light on the risk factors contributing to PCa initiation and also an epidemiological insight into PCa cases in Indian subcontinent in terms of incidence rates and trends over time

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INTRODUCTION

Prostate cancer accounts for being the second most commonly diagnosed cancer and sixth leading cause of cancer mortalities in men worldwide. Globocan (2012) reported an estimated 1.1 million new cases and 300700 cancer deaths in 2012 (Ferlay *et al*., 2013). Researchers have established a number of risk factors including advancing age, family history, change in lifestyle, smoking, western diet and BMI for increasing PCa cancer incidences in men worldwide. India has been witnessing a constant and rapid increase in PCa cases in the current scenario. Reports suggest that number of Prostate cancer cases worldwide will double by 2020 (Tewari *et al*., 2013).

Key facts about PCa

- According to reports in 2015, approximately 220,800 men were diagnosed with Prostate cancer, and more than 27,540 men died from the disease.
- One new case occurs every 2.4 minutes and a man dies from Prostate cancer every 19.1 minutes.
- As men increase in age, their risk of developing Prostate cancer increases exponentially. Although only 1 in 10,000 under age 40 will be diagnosed, the rate shoots up to 1 in 38 for ages 40 to 59 and 1 in 14 for ages between 60 to 69. About 60% of all Prostate cancers are diagnosed in men over the age of 65 and 97% occur in men in 50 years of age and older.
- A non-smoking man is more likely to get Prostate cancer than lung, bronchus, colon, rectal, bladder, lymphoma, melanoma, oral and kidney cancers combined.
- A man is 35% more likely to be diagnosed with Prostate cancer than a woman is to be diagnosed with breast cancer.
- Because it is a relatively slow-growing cancer, the five-year survival rate for Prostate cancer diagnosed at all stages is 98 per cent. The 10-year survival rate is 84 per cent and the 15-year survival rate is 56 per cent. (http://www.pcf.org/site/c.leJRIROrEpH/b.5800851 /k.645 A/Prostate_Cancer_FAQs.htm)

Epidemiology of PCa in India

The reported prevalence of India is low as compared to western countries but with migration of population from rural to urban cities, change in lifestyle habits, diet patterns, increased awareness and access to medical facilities, more and more cases of PCa are being reported in Indian population.

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PCa in Indian population

- The life time risk of developing Prostate cancer in a man's life is one out of seven.
- Six in ten cases are diagnosed at the age of 65 years or later.
- The incidence of PCa in Indian population is 15%.
- The life expectancy in India has increased from 61.97 in 2001 to 65.48 in 2011, causing PCa incidences to grow by 1% gradually.
- Around 20-30 new cases are reported every month in India. (http://www.newindianexpress. com/cities/bengaluru/Have-you-crossed-50-Get-yourself-checked-for-prostate-cancer/2013/09/18/ article1790436.ece)

Burden of PCa in Population Based Cancer Registries

The most recent Population Based Cancer Registries (PBCRs) of different cities in India showed that Prostate cancer ranks among the top ten leading sites of cancer in cities like Bangalore, Barshi, Bhopal, Chennai, Delhi, Mumbai, Kamrup, Ahmedabad, Kolkatta, Kolam, Nagpur, Pune, Wardha and Thiruvanthapuram. PCa ranks as second most common cancer in metropolitan cities such as Delhi, Pune, Kolkatta and Thiruvanthapuram and ranks third in Bangalore and Mumbai. It has been reported that the incidences of PCa is much lower in rural cities as compared to urban areas (Table 1) (Jain *et al*., 2014).

Table 1. PBCR data showing the relative proportion, Rank, Crude rate and Age Adjusted rate of Prostate cancer incidences in India

S. No.	City	Relative proportion	Rank	Crude Rate	Age adjusted rate per 100000 population	Duration
1	Bangalore	6.7%	3rd	5.3	8.9	2008-2009
2	Barshi rural	4.4%	7th		1.9	2009-2010
3	Barshi expanded	5.5%	4th	2.0	1.9	2009
4	Bhopal	5.2%	5th	3.8	6.6	2009-2010
5	Chennai	5.9%	4th	6.3	7.0	2009
6	Delhi	6.8%	2nd	5.2	10.7	2008-2009
7	Mumbai	6.8%	3rd	4.8	7.8	2009-2010
8	Kamrup urban	4.6%	6th		11.1	2009-2011
9	Ahmedabad rural	2.9%	7th		2.6	2009-2010
10	Ahmedabad urban	3.5%	7th		5.4	2009-2010
11	Kolkatta	7.5%	2nd	7.6	6.9	2008-2009
12	Kollam	4.8%	5th	6.2	5.7	2009-2010
13	Nagpur	3.2%	9th		3.4	2008-2009
14	Pune	8.6%	2nd	4.5	7.2	2009-2010
15	Thiruvanathapuram	6.4%	2nd	9.1	8.5	2009-2011
16	Wardha	2.9%	9th		2.0	2010-2011

Table 2. Annual Percentage change for different PBCRs

S. NO.	PBCR	Annual Percentage change (APC)	Duration
1	Bangalore	3.4%	1982-2009/10
2	Chennai	4.2%	1982-2009/10
3	Delhi	3.3%	1988-2009/10
4	Mumbai	0.9%	1982-2009/10
5	Kamrup urban district	11.6%	2003-2010/11

Time trends in Prostate cancer in India

The three decade spanned "Time Trends in Cancer Incidence Rates from 1982-2010" data shows that PCa has statistically increased in incidence rates. (Jain *et al*., 2014) A significant increase of PCa incidences in Bangalore (3.4%), Chennai (4.2 %), Delhi (3.3%), Kamrup (11.6%) and Mumbai (0.9%) has been observed over time (Table 2).

Risk factors

Age

Prostate cancer is known to be a disease of elderly men. The American Cancer Society in its reports states 66 years as the average age at the time of diagnosis. The changing life expectancy however has not matched with the awareness level for Prostate cancer in Indian population. Studies have showed that the risk of developing cancer increases from 0.005% in men below 40 years to 2.2% in men who are 40 to 59 years of age and almost to 13.7 % in men between the age group of 60 and 79 years (Stangelberger *et al*., 2008)

Family history

Studies around the world have shown that family aggregation of Prostate cancer, leads to a 2-3 fold higher chance of developing Prostate cancer if there is a first degree relative with Prostate cancer (Langeberg *et al*., 2006). Reports suggest that men with two or more first degree relatives of Prostate cancer have as high as five times more risk of developing Prostate cancer (Schaid *et al*., 2004).

Diet

There is a major shift in dietary patterns in food consumption in Indian population (Saka *et al*., 2016).

The dietary patterns are largely getting influenced by Western lifestyle preferences of red meat and dairy products consumption. Red meat and dairy products are considered to be directly related to Prostate cancer risk. Mahmod *et al*., in his study concluded that the consumption of milk and dairy products increased chances of PCa development by more than 12 fold. (Mahmood, 2012) Studies carried out by Song *et al*.,

showed whole milk consumption to be directly associated with fatal Prostate cancer and lesser survival chances in older aged men (Song *et al*., 2013). Several researches have also showed meat cooked at higher temperature to be directly associated with development of Prostate cancer (John *et al*., 2011)

Obesity

Hsing *et al*., and Ganesh *et al*., in their studies have concluded that the risk of PCa in obese men was two times higher than non-obese men (Hsing *et al*., 2006 and Ganesh *et al*., 2011). Though more researches need to be carried out to explore the contribution of obesity in PCa development, studies so far have showed a positive correlation between the two.

Occupation

Occupation is another risk factor highly correlated with Prostate cancer in many studies. Data shows that the use of agricultural chemicals such as pesticides, acetic acid, arsenic compounds, lubricating oils, greases and solvents make farmers two folds more susceptible to Prostate cancer (Ragin *et al*., 2013 and Parent *et al*., 2009).

Lifestyle choices: Smoking, sexual behaviour, sexually transmitted diseases

Numerous case control studies are being carried out to find out a correlation between lifestyle choices and development of Prostate cancer. So far no conclusive results are reported. Since, smoking causes continuous exposure to carcinogens (polycyclic aromatic hydrocarbons) and can compromise the sex steroid hormones effect and thus can contribute to development of more aggressive Prostate cancer. Thus smokers have a 14% more risk of dying from PCa as compared to non-smokers. (Huncharek *et al*., 2010) A study conducted by Dennis and Dawson., 2002 reported a positive correlation between history of STDs (syphills, gonorrhoea) and susceptibility to Prostate cancer (Dennis *et al*., 2002). Another study conducted by Hosseine *et al*., in 2010 showed history of prostatis to be positively correlated with Prostate cancer risk (Hosseini *et al*., 2010).

Vasectomy

Some studies have suggested that men who have undergone vasectomy (minor surgery to make men infertile) have a slightly increased risk for Prostate cancer (Giovannucci *et al*., 1993) however some have reported a negative correlation as well. Several researchers are still trying to find possible correlation of vasectomy and increased risk for Prostate cancer (Siddiqui *et al*., 2014).

Conclusion

Prostate cancer is characterized by wide variations in incidences and mortality worldwide. Various epidemiological observations have now provided valuable insights into the etiology of Prostate cancer. Studies around the world have given intriguing leads highlighting environmental, genetic and epigenetic factors as major risk factors of PCa. The new generation large scale population based studies are focussing on investigating individual and synergistic effects of these factors as potential risk factors to predict their contribution in initiation of PCa. With increase in elderly population in India, Prostate cancer adds to the burden of geriatric health diseases including diabetes, cardiovascular diseases and other NCDs. PCa comes out to be the second leading cause of cancer sites in urban cities and the need of the hour demands for increased awareness among Indian population towards PCa, its risk factors and treatments available in the country.

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