RESEARCH COMMUNICATION

Incidence and Trends of Prostate Cancer in Karachi South, '1995- 2002'

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Abstract

Introduction: Cancer prostate (CaP) is a commonly diagnosed cancer in western men, but there is sparse information about the demographics of this malignancy in Pakistan. The study objective was to provide an overview of CaP in Karachi, Pakistan. Methodology: Epidemiological data of 282 incident CaP cases registered at Karachi Cancer Registry (KCR) during 1st January 1995 to 31st December 2002 were reviewed. Incidence and trends were studied in 2 time periods, 1995-7 and 1998-2002. Results: In 1995-7, CaP accounted for approximately 3.4% of the cancers in males and ranked 8th in hierarchy with an age standardized incidence rate (ASR) world and crude incidence rate (CIR) per 100,000 of 6.0 and 2.8 respectively. During 1998-2002, CaP accounted 4.6% of the cancers, ranked 4th with an ASR world and CIR per 100,000 of 10.1 and 4.4. Thus an approximate 60% increase was observed between 1995 and 2002. Mean ages of the patients were 67.0 and 67.4 years. Age-specific curves showed a gradual increase in risk from the fifth decade onwards. A marginal down staging was also observed in period 2, more apparent in the more educated Mohajir and Punjabi ethnicities. Conclusion: Karachi falls into a low risk region for CaP, with a rapidly increasing incidence and a marginal down staging. The probable reasons for the lower incidence are a low life expectancy, lack of availability or accessibility to health care and lack of public awareness. Implementation of CaP screening and public health education is a necessity today. The low incidence of CaP in Pakistan may be an artefact!

Key Words: Prostate cancer - demographics - Karachi, Pakistan

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Introduction

Cancer prostate (CaP) is a commonly diagnosed malignancy with a global increase in incidence. Geographical variation is a hallmark of CaP with large disparities in the incidence of high and low-risk countries. The age standardized incidence rates (ASRs) for CaP vary by up to a factor of five between industrialized countries of North America and Europe and the Asian countries (Parkin et al., 2002). The high incidence in the west could reflect a combination of genetic and environmental risk factors but is more likely a result of improved health coverage, better diagnostic facilities and longer life expectancy of the population at risk (Hsing et al, 2000; Damber and Aus, 2008).

Karachi South, the southern-most district of Karachi includes all ethnicities of the country, namely Sindhis, Punjabis, Pathans, Baluchs and Mohajirs with a fair representation of all socio-economic categories. In the absence of a national cancer registration system, KS qualifies as a sample population of the country.

The present study was conducted with the objective of examining descriptive epidemiological characteristics and pathology of CaP in Karachi.

Materials and Methods

Epidemiological data of incident prostate cancer cases, International Classification of Diseases, 10th edition (ICD-10) category C61 registered at Karachi Cancer Registry (KCR) for Karachi South (KS), during 1st January 1995 to 31st December 2002 were reviewed (WHO, 1992).

The present study included clinically diagnosed and

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microscopically verified cases. All surgical specimens were initially evaluated on Hematoxylin and Eosin (H&E) stained sections. Special stains and immunohistochemistry were selectively used. Variables recorded were the hospital patient-number, date of incidence, name, age, address, ethnicity, topography, morphology and grade. The tumours were graded by the Gleason's score (Gleason, 1992). Where Gleason's scoring was not available, cases were categorised as well, moderately and poorly differentiated. Data were classified using International Classification of Diseases-Oncology, 3rd edition (ICD-O3) and computerized using a customized version of CANREG-4 software (WHO, 2002). Manual and computerized validity check for the cancer data were performed as per recommendations of International Agency for Research on Cancer (IARC) and International Association of Cancer Registries (IACR) (Parkin et al., 1994).

Crude, age-adjusted, and age-specific incidence rates were calculated for prostate cancer. The person years of population at risk by sex and 5-year age-groups were estimated with the mid-1996 population, based on the 1998 census population of 893,684 males assuming an annual growth rate of 1.94%. The growth rates were based on the inter-census growth-rate and measures for inflow and outflow of population, calculated by the Federal Bureau of Statistics. Standardized incidence rate was calculated with an external reference population, the 'world' population with a given 'standard' age distribution (Segi, 1960). The methodology applied was direct standardization, using 5-year age groups. The rates given are the annual incidence per 100,000 population averaged over the number of years for which data are presented'. Incidence tables were based on ICD-10 (WHO, 1992).

Trends were studied by categorizing the cases into 2 groups '1995-7' and 1998-2002'. The data were analyzed using SPSS 16.0.

Results

Epidemiological data of 282 incident CaP cases registered at Karachi Cancer Registry (KCR) during 1st January 1995 to 31st December 2002 were reviewed. Seventy six cases of CaP were registered during a three year period, 1st January, 1995 to 31st December 1997 and 208 cases in the 5 year period - 1st January, 1998 to 31st December 2002.

In period '1' (1st January, 1995 to 31st December 1997) CaP accounted for approximately 3.4% of the cancers in males and ranked 8th in hierarchy with an ASR (world) and crude incidence rate (CIR) per 100,000 of 6.0 and 2.8 respectively (Bhurgri et al., 2002). During period '2' 1998-2002, CaP accounted 4.6% of the cancers, ranked 4th with an ASR world and CIR per 100,000 of 10.1 (9.2-11.0) and 4.4 respectively. Thus an approximate 60% increase was observed between 1995 and 2002.

In 1995-7, the mean age of the cancer patients was 67.0 years (95% CI 64.68; 69.32; SD ±10.12) and the age range was 49 years (45 - 94 years). The age-specific curves showed a gradual increase in risk from the fifth until the seventh decade, followed by an apparent decrease in risk after the seventh decade (Figure 1). During 1998-2002, the mean age of the cancer patients was 67.4 years (95% CI 65.8; 68.9; SD ±11.3). The age range was 50 years (45 - 95 years). Age-specific curves showed a gradual increase in risk from the fifth decade onwards, without the apparent decrease in incidence after the seventh decade. The distribution by age, religion, ethnicity, education, occupation and marital status are given in Table 1.

In the 1995-7 period, majority of the cases presented as moderately differentiated lesions (64.5%). Well differentiated and poorly differentiated malignancies

Table 1. Frequency of Cancer Prostate Cases on the Basis of Religion and Ethnicity

		1998-2002	1995-1997
Age-standardized Rate*		10.1 [5]+	6.0 [14]
Crude Incidence Rate*		4.4 [5]	2.8 [14]
Mean age (years)		67.4 ±10.1	67.0±10.1
Religion	Muslims	204 (98.1)	72 (94.7)
	Christians	3 (1.4)	2 (2.6)
	Parsees	1 (0.5)	2 (2.6)
	Hindus	-	-
Ethnicity	Mohajirs (Urdu)	70 (33.7)	10 (13.2)
	Punjabis	26 (12.5)	7 (9.2)
	Sindhis	24 (11.5)	9 (11.8)
	Baluchs	8 (3.8)	8 (10.5)
	Mohajirs (Memon)	21 (10.1)	5 (6.6)
	Pathans	23 (11.1)	7 (9.2)
	Mohajirs (Gujrati)	18 (8.7)	6 (7.9)
	Afghans	6 (2.9)	1 (1.3)
	Unknown	12 (5.8)	23 (30.3)

*/100,000 population, +rank in frequency of cancers

Table 2. Frequency of Cancer Prostate Cases on the Basis of Morphology, Grade and Extent of Disease

		1998-2002	1995-1997
Grade	Well differentiated	22.6	10.5
	Moderately differentiated	44.2	64.5
	Poorly differentiated	26.3	13.2
	Unknown	4.8	11.8
Extent of spread	Localized	51.0	53.9
	Regional	28.8	10.5
	Distant	8.2	22.4
	Unknown	12.0	13.2
Morphology	Adenocarcinoma	95.2	98.7
	Squamous CC	2.0	-
	Others	2.8	1.3

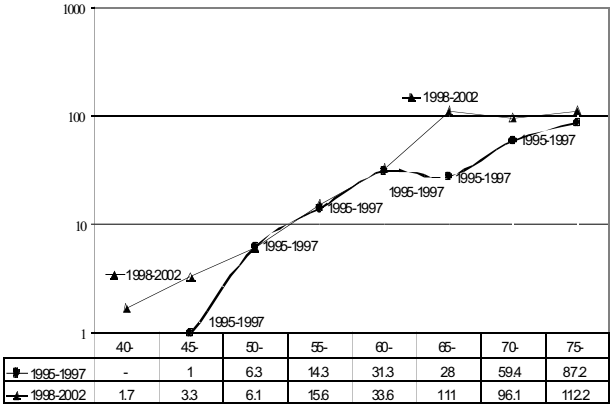

Figure 1. Age-specific Incidence Rates for Cancer Prostate Karachi South, 1995-1997 and 1998-2002

formed 10.5% and 13.2% of the cases respectively. Approximately half the cases presented as localized cancers (53.9%) and a third (35.6%) at an advanced stage; 10.5% cancers had spread to the regional lymph nodes and 22.4% to a distant site at the time of diagnosis (table 2). In the 1998-2002 period too, the majority of cases presented as moderately differentiated lesions (44.2%), with well and poorly differentiated malignancies forming 22.6% and 26.3% of the cases respectively. Approximately half the cases presented as localized cancers (51.0%) and a third (37.0%) at an advanced stage; 28.8% cancers with regional spread and 8.2% distant spread.

Microscopic confirmation was 99% and 100% in the 2 data sets. The morphology of the cancers is given in period 1 was adenocarcinoma (M-8140/3) in 74 (97.4%) cases and papillary adenocarcinoma (M-8260) in one (1.3%) case. Morphological sub-categorization was not possible for one (1.3%) case. The morphology in period 2 was adenocarcinoma, 198 (95.2%) cases, squamous cell carcinoma (M-8070-2) 4 (2%) cases, other 2 (1%) cases and undifferentiated 3 (1.5%) cases.

Discussion

On the basis of the current data Karachi falls into a low risk region for CaP, albeit with an increasing incidence and a marginal down staging over a decade. In period '1' (1995-7) KCR incidence for CaP ranked 205th amongst the 230 contemporary registries listed in Cancer Incidence in the Five Continents (CIV) volume eight (Parkin et al., 2002). In period '2' it ranked 273rd amongst 300 registries in CIV volume nine (Curado et al., 2007). The highest incidence (ASR per 100.000) for CaP in Asia in the study period (1995-7; 1998-2002) was observed in Jews born in Israel (47.46; 49.2), followed by Manila (22.31; 25.3). The incidence of CaP in the subcontinent and the Gulf region remained low (Parkin et al., 2002; Ghafoor et al., 2003; Mosli, 2003; Curado et al., 2007; Pourmand et al., 2007).

Registries in India report a low, but rising incidence of CaP (Yeole, 2008). The Indian data lends credence to the incidence in KS. A low CaP incidence was also observed in the South Asian migrant populations in United Kingdom (UK) giving credit to the view that environmental factors may either not play a crucial role in the development of the disease or are not prevalent in this population. It should be noted that the migrant South Asians in UK had access to the same health care as the whites, a similar life expectancy and presented with early disease (probable effect of CaP screening), nonetheless the incidence remained low in this population (Metcalfe et al., 2008).

The established primary risk factors for CaP are age, race and family history. CaP is a disease of older men. Most cases are diagnosed in men over 65 years of age. The lower incidence in Karachi could be attributed to the lower life expectancy in the country. WHO 2008 (World Health Report, 2008, a & b) has reported a life expectancy at birth for Pakistani males as 62 years, whereas in comparison the life expectancy for American men is 75 years. CaP is a slowly progressing disease and many men especially those in developing countries die of natural causes or other competing diseases before it is diagnosed or causes harm. Race or ethnicity appears to play some role in the development of CaP. In the US the disease is more common in African-Americans than in other American ethnic groups risk (Damber and Aus, 2008). The multiethnic KS data however did not identify any high risk group in its component ethnicities.

Other factors which may influence the development of the disease are environmental viz. diet and a history of venereal diseases. A history of allergies, benign prostate hyperplasia, an annual physical exam and diabetes mellitus are reportedly associated with a reduced risk (Crawford, 2003; Lightfoot et al., 2004; Tavani et al., 2005). In the aetiology of CaP the correlation for alcohol and tobacco is inconclusive (Rohrmann et al., 2008). The low incidence of CaP in Saudi Arabia, UAE and Karachi despite the high saturated fat diet in these countries challenges the studies which indicate a positive association of a high fat diet with CaP (Pienta and Esper, 1993). Theories associating high calcium intake, vitamin D and phosphorus with CaP have also not gained momentum (Chan et al, 1998a; Tavani et al, 2005).

A theory which needs further investigation in the population at risk is the association of CaP with sex steroid hormones (Chan et al, 1998b; Sasagawa and Nakada, 2001). Low circulating androgens and their adrenal precursors may partially account for the decreased risk for CaP amongst the low risk population (Kehinde et al., 2006).

The apparent decrease in risk after the seventh decade in the study population in period 1 is a probable cohort effect observed for all cancers in this data set. This effect is not seen in period 2 and could be attributed to a cohort shift or an increasing availability of health care for the above 70 years age group.

The small sample size was a limitation to our study. Though the district met the criteria of a sample population, doubts exist about its generalizibility of these data to represent the country.

On the basis of the present study Karachi falls into a low risk region for CaP, with an increasing incidence, up-ranking and a marginal down staging. The probable reasons for the yet lower incidence is a lower life expectancy, lack of availability or accessibility to health care and lack of public awareness. In the absence of screening this may be an artefact. More studies are required to obtain a deeper insight into CaP in Pakistan especially those focused on preventable environmental risk factors like diet and hormones. Implementation of screening and public health education are a necessity today.

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