

MINI-REVIEW

Incidence and Mortality from Mucosal Head and Neck Cancers amongst Australian States and Territories: What It Means for the Northern Territory

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Abstract

Mucosal head and neck cancers are squamous cell carcinomas that develop in the upper-aero digestive epithelium. Together they constitute the sixth most common cancer with an estimated 900,000 new cases and 350,000 deaths each year reported worldwide. The risk factors are tobacco, alcohol and human papillomavirus (HPV). Our research team initially reported a high incidence rate of HNC in the indigenous population of the Northern Territory. Mortality rates also vary in the Australian States and Territories, with particularly high mortality observed in the Northern Territory. There is a paucity of incidence studies of HNC for the Australian States and Territories. Therefore this review primarily focuses on variation in incidence and mortality across the country and highlights specifically the high incidence and mortality in the Northern Territory. Attention is also given to sex-specific incidence and mortality rates

Keywords: Head and neck cancer - incidence rate - international classification disease - mortality rate - risk factors

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Introduction

Most head and neck cancers ($\geq 90\%$) are squamous cell carcinomas (SCCs) originating from mucosal lining of oral and oropharyngeal, hypopharynx, larynx, sinonasal tract and nasopharynx, and thus termed head and neck squamous cell carcinoma (HNSCC) (Argiris and Eng, 2004; Marur et al., 2010). The global trends for head and neck cancer (HNC) in terms of incidence, etiologic, and demographic patterns has been changed in past 15 years (Johnson-Obaseki et al., 2012). HNC is the sixth most common cancer; an estimated 900,000 new cases and 350,000 deaths each year have been reported worldwide (Parkin et al., 2005; Silveira et al., 2012). HNC is considered as lethal diseases for approximately 50% of diagnosed cases, which is primarily due to late detection in advanced stages (Warnakulasuriya, 2009). The successful treatment of these patients depends on early detection and the right therapy (Rezende et al., 2010). HNC is strongly associated with certain environmental and lifestyle risk factors including tobacco use and alcohol consumption, UV light and certain strains of HPV (Human Papilloma Virus) (Döbrössy, 2005).

The incidence and mortality from cancer of the oropharynx have previously been reported higher in the Indigenous people than in the non-Indigenous people in the Northern Territory (NT), Australia (Cunningham

et al., 2008). The incidence of HNC was reportedly the same for both Indigenous and non-Indigenous people, but mortality was three times greater for Indigenous people in Queensland between 1997 and 2006 (Moore et al., 2010). There are not enough studies to compare the incidence and mortality rate of HNC among the Australian States and Territories.

Literature Survey

The incidence and mortality data were obtained from a web-based search using key words such as incidence rate, mortality rate and risk factors of HNC and /or HNSCC. We have reviewed the articles from PubMed, MEDLINE, Google Scholar and reports from the Australian cancer councils. This review paper collates data from cancer registries of the Australian States and Territories that covering almost the entire Australian population.

The International Classification Disease (ICD) coding system of World Health Organisation (WHO) is widely used in the international database for HNC (Döbrössy, 2005). The termed as International Classification of Disease for Oncology (ICD-O) often used in the hospital at the time of diagnosis of sub-types of HNC. The ICD code for HNC (C01-C14 and C30-C32) is a term given to epithelial malignancies in the oral cavity (C01-C09), pharynx (C10-C14), nasal cavity (C30), para-nasal sinuses

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(C31) and larynx (C32).

Data Abstraction

Two investigators (J.S and R.J) independently abstracted data on the first author and year of publications, number of cases, methods of evaluation of data, studies States and Territories, overall and Age standard HNC incidence rate. However, the data has given as individual diagnostic sites, especially oral and oropharyngeal regions of HNC for Western Australia, Queensland and Victoria, and they are compiled according to ICD cancer codes (C01-C14, C30-C32). The male to female ratio for HNC was calculated according to the number of new cases in the Australian States and Territories. Incidence rate is expressed as number of cases per 100,000. Age-standardised incidence rates for Australian Capital Territory (ACT) were estimated between 2002 and 2006. The incidence rate of HNC in other States and Territories were estimated for 2007. We have selected a year 2007 for the Australian States and Territories due limited data available in the cancer councils of ACT and Northern Territory.

Common Risk Factors for HNC

In assessing, the differences in incidence and mortality rates for the States and Territories of Australia, the explanation likely lies with appreciating the known causative agents and risk factors for HNC. The major risk factors for mucosal HNC are tobacco use, excess alcohol consumption and betel quid usage (Franceschi et al., 1994; Parrish et al., 1993; International Agency for Research on Cancer (IARC), 2010). Both alcohol and tobacco use are estimated to be more than 80% of attributable risk of HNC (Warnakulasuriya, 2009).

There is a geographic variation in HNC incidence between different countries of the world and among different regions within a country which conform to the trends in the major risk factors of HNC. This indicates that environmental factors may play a vital role in the pathogenesis of HNC (Attar et al., 2010).

In general, HNC is a tobacco smoking-related disease (Cataldo et al., 2010). Some studies have reported that tobacco smoking increased the risk of several cancers, including HNC (Blot et al., 1988; Basu et al., 2008). Tobacco smoking is also an important risk factor for laryngeal cancer and shows a strong dose-response relationship (Maestro et al., 1992; Somers et al., 1992). In Australia, about 70% of laryngeal cancers are attributed fully or in part to smoking (Australian Institute of Health and Welfare, 2004). Excess alcohol consumption can cause HNC by itself and also act as a synergistic factor with tobacco in aetiology of HNC (Viswanathan and Wilson, 2004). The Northern Territory has highest smoking rate and alcohol consumption than any States and Territory in the Australia (Skov et al., 2010).

Human papillomavirus (HPV) infection has been found to be strongly associated with oropharyngeal cancer (Gillison, 2004). Although the incidence of HNC associated with tobacco and alcohol consumption has

decreased considerably in the developed world, that of oropharyngeal cancers has increased (ACT Cancer Registry, 2009).

The main limitation of our review is the fact that cancer registries and reports have only limited data available pertaining to each risk for HNC patients. HPV testing is now standard in most Australian centres, so potentially a follow-up study will be able to address this point.

Incidence of HNC among the Australian States and Territories

HNC is a serious and growing problem in many parts of Australia (Australian Institute of Health and Welfare, 2005). Oropharyngeal cancers in the Australia, make up 2-3% of all cancers (Park et al., 2011). An increase from 23% to 28% in the incidence of oropharyngeal cancers over the period 2002-2011 is estimated (Australian Institute of Health and Welfare, 2005). It is a notifiable disease in all States and Territories of the Australia.

The incidence rate of HNC appears to be 12.3 per 100,000 in Australia, and is more frequently diagnosed among males than females (Australian Institute of Health and Welfare, 2008). In 2006, approximately 2,756 cases of HNC were diagnosed in Australia, and males were more likely to have HNC, with 2,059 new cases reported, accounting for 3.5% of all new male cancers (Australian Institute of Health and Welfare, 2008). On the other hand, 697 females were diagnosed with HNC, accounting for 1.5% of all new cancers in females (Australian Institute of Health and Welfare, 2008). The total numbers of new cases in 2007 are illustrated for Australian States and Territories (excluding ACT for which data is available only from 2002 to 2006) in Table 1.

The risk for developing HNC increase with age and the majority of cases occur in people aged 50 and over. In 2007, the lifetime risk of developing HNC observed was higher in males (1 in 62) than females (1 in 205) (Australian Government and Cancer Registry, 2006).

Incidence of HNC in the Northern Territory population appears to be 31.1 (52% in males and 10.2% in females) which is far higher than the rest of Australia (Department of Health, 2011). The incidence rate of HNC in the Australian States and Territories are illustrated in Figure 1. Highest incidence rate of HNC has reported in the Northern Territory and approximately 5 times higher

Table 1. Number of New Cases for HNC among Australian States and Territories by Sex

States and Territories	Male	Female	Total	Year
Northern Territory	42	10	52	2007
New South Wales	638	262	900	2007
Victoria	439	151	590	2007
Tasmania	46	13	59	2007
Queensland	487	164	651	2007
South Australia	130	60	190	2007
Western Australia	262	90	352	2007
Australian Capital Territory	96	36	132	2002-2006

*Aitken et al., 2008; Cancer Concil Victoria, 2010; Queensland Cancer Registry, 2010; Tasmanian Cancer Registry, 2010; Western Australia Cancer Registry, 2009; ACT Cancer Registry, 2009; Department of Health, 2011; South Australian Cancer Registry 2010

Table 2. Number of Deaths for HNC among Australian States and Territories by Sex*

States and Territories	Male	Female	Total	Year
Northern Territory	15	4	19	2007
New South Wales	257	86	343	2007
Victoria	186	83	269	2007
Tasmania	24	2	26	2007
Queensland	155	51	206	2007
South Australia	62	21	83	2007
Western Australia	84	29	113	2007
Australian Capital Territory	34	20	54	2002-2006

*Aitken et al., 2008; Cancer Concil Victoria, 2010; Queensland Cancer Registry, 2010; Tasmanian Cancer Registry, 2010; Western Australia Cancer Registry, 2009; ACT Cancer Registry, 2009; Department of Health, 2011; South Australian Cancer Registry 2010

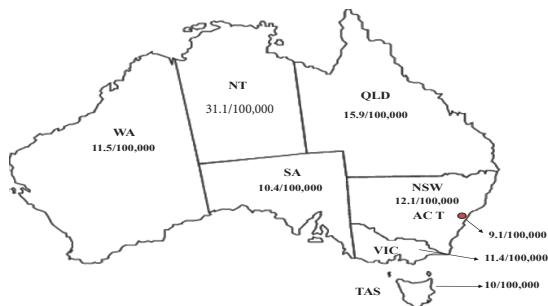


Figure 1. Incidence Rates of HNC among Australian States and Territories (Aitken et al., 2008; Cancer Concil Victoria, 2010; Queensland Cancer Registry, 2010; Tasmanian Cancer Registry, 2010; Western Australia Cancer Registry, 2009; ACT Cancer Registry, 2009; Department of Health, 2011; South Australian Cancer Registry 2010)

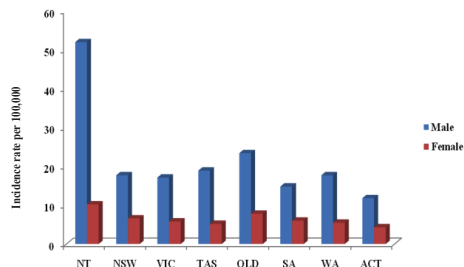


Figure 2. Incidence rate of HNC for males and females in the Australian States and Territories (Aitken et al., 2008; Cancer Concil Victoria, 2010; Queensland Cancer Registry, 2010; Tasmanian Cancer Registry, 2010; Western Australia Cancer Registry, 2009; ACT Cancer Registry, 2009; Department of Health, 2011; South Australian Cancer Registry 2010)

in males than in females, (Department of Health, 2011) as shown in Figure 2. In addition, Indigenous people comprise about 2.4% of the Australian population and 32% (66,600) in the Northern Territory (Pink, 2006). While this segment of the Northern Territory accounts for over 47% of the HNC presenting to the Royal Darwin Hospital (Thomas et al., 2011). It is possible that the number of non-Indigenous patients who have HNC may be underestimated, as some may choose to travel interstate for management, particularly those with private insurance.

The second highest incidence rate of HNC has

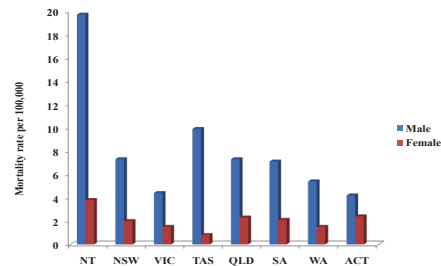


Figure 3. Mortality Rate of HNC for Males and Females in Australian States and Territories (Aitken et al., 2008; Cancer Concil Victoria, 2010; Queensland Cancer Registry, 2010; Tasmanian Cancer Registry, 2010; Western Australia Cancer Registry, 2009; ACT Cancer Registry, 2009; Department of Health, 2011; South Australian Cancer Registry 2010)

reported in Queensland in 2007. Males in Queensland have approximately two times higher incidence rate of HNC than females (Queensland Cancer Registry, 2010). Furthermore, Western Australia, New South Wales, Tasmania and Victoria have reported similar incidence rate of HNC; (Aitken et al., 2008; Western Australia Cancer Registry, 2009; Cancer Concil Victoria, 2010; Tasmanian Cancer Registry, 2010) however, South Australia and ACT showed lower incidence rate than other States and Territories (ACT Cancer Registry, 2009; South Australian Cancer Registry 2010).

The Mortality Rate of HNC among the Australian States and Territories

The mortality rate of HNC among males (667; 3%) were higher than females (231; 1.3%) (Australian Government and Cancer Registry, 2006). In 2007, there were 898 deaths from HNC in Australia, accounting for 2.3% of all cancer deaths. The data of deaths for HNC among Australian States and Territories showed in Table 2. However, the higher mortality rate of females HNC patients has observed in the Northern Territory than females from other States and Territories of Australia, as shown in Figure 3. The mortality rate for Northern Territory has reported 11.7 for HNC based on 19 deaths, which is comparatively higher to other States and Territories (Department of Health, 2011). Queensland, New South Wales, Tasmania, and South Australia had similar mortality rate of HNC patients in year 2007 (Aitken et al., 2008; Queensland Cancer Registry, 2010; Tasmanian Cancer Registry, 2010; South Australian Cancer Registry 2010). However, Western Australia, Victoria, ACT have reported low mortality rate with 3.4, 2.9 and 3.3, respectively (ACT Cancer Registry, 2009; Western Australia Cancer Registry, 2009; Cancer Concil Victoria, 2010).

Conclusion

The deterioration of basic functions affecting head and neck areas, regardless of tumour site, are quite apparent and influence patient's lives. High incidence of HNC is observed with an increase in incidence rates in Australian

men. HPV-associated HNC in Australia is currently increasing, the trend may be attributable due to change in sexual behaviours (Hocking et al., 2011).

High incidence and mortality rates of HNC have observed in the Northern Territory which indicates that most cases were in an advanced stage at the time of detection despite the regular screening and examination. There is generally a lack of awareness of its symptoms, and causes of HNC existing worldwide. These gaps in knowledge need to be addressed by further public education. The new cases of HNC in the Northern Territory may be also an underestimate of the true numbers as some patients are living in remote communities. This could have implications on screening strategies and treatment for HNC in the Territory's remote communities.

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