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Original article

Ethnic variation of the histological subtypes of renal cell carcinoma in Singapore

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KEYWORDS
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Abstract

Introduction: The purpose of this study is to determine how the histological subtypes of renal cell carcinoma (RCC) vary among the heterogeneous Singaporean population and how this affects the survival rate.

Patients and methods: The data analyzed in this retrospective study of the histological subtypes of RCC cases treated in Singapore General Hospital over a ten year period (2001–2010) were obtained from the Cancer Registry of the hospital's department of urology. Statistical analysis was done using the Statistical Package Service Solution (SPSS) version 17.0 software. Chi Square and *z*-tests were used where appropriate; a p value <0.05 was considered significant.

Results: The records of 676 patients studied showed that 80.8% of the patients were Chinese, while Malays, Indians and other minor groups accounted for 6.5%, 4.6% and 8.1%, respectively. The mean age (SD) at presentation was 58.1 (12.1), 57.6 (10) and 55.1 (9.6) years for the Chinese, Indians and Malays, respectively. The commonest histological variant in each of the ethnic groups, irrespective of sex, was clear cell carcinoma which accounted for 79.7% of all the histological subtypes found in Chinese, for 70.5% in Malaysian and 77.4% in Indian patients. The sarcomatoid histological subtype was found in 4.3% of the studied population with a high prevalence in the Indian ethnicity (9.7%). The worst survival rate (33.3%) was recorded among Malays with the papillary cell subtype, and also in the Chinese population the highest mortality rate was found in cases with the papillary cell subtype (16.9%).

Conclusion: The commonest histological subtype of RCC in each of the studied ethnic groups in Singapore is clear cell carcinoma. However, most of the cancer deaths in Chinese (16.9%) and Malays (66.7%)

Abbreviations: RCC, renal cell carcinoma; Std, starndard.

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were associated with the papillary cell type, while in Indians the sarcomatoid component prevailed (9.7%). Thus, the usual prognostic trend for RCC subtypes cannot be applied to all Singaporean ethnicities, necessitating individualization of prognosis for each group.

Introduction

The incidence of renal cell carcinoma (RCC) varies across various geo-ethnic groups worldwide. RCC is the 13th most common malignancy worldwide, with approximately 271,000 new cases diagnosed in 2008 [1]. The highest incidence is found in Europe, North America, and Australia, whereas it is low in India, Japan, Africa, and China. In the United States, RCC accounts for 2–3% of all adult malignant neoplasms [1,2] and is the most lethal of all urologic cancers [2]. Incidence rates are 10–20% higher in African Americans for unknown reasons [2].

The Czech Republic has the highest age-standardised rate for RCC in Europe. This has been estimated to be 33.6 and 15.0 per 100,000/year for males and females, respectively [3]. Other European countries that have been documented to have high incidence rates include Lithuania, Latvia, Estonia, and Iceland, while the incidence is lowest in Romania, Cyprus, and Portugal [3]. The age-standardised rates for Singaporean males and females are 5.4 and 2.9 per 100,000/year [4], respectively. RCC typically occurs in the fifth to seventh decade of life and is more common in the Chinese population compared to Indians and Malays [4].

The histological variants of RCC differ in prognostic significance with the sarcomatoid variant signifying an especially poor prognosis [5,6] when present in any of the histological subtypes. These histological subtypes have also been shown to vary across different ethnic groups. Young African Americans with sickle cell traits have been found to rather have the medullary type of RCC [7,8]. Papillary RCC has also been shown to be commoner among the black compared to the white population in the United States [9]. In Malaysia, a neighboring country to Singapore, a ten-year review of the clinical characteristics of RCC revealed that the clear cell histological subtype was the commonest (75.1%) among the ethnic groups studied [10]. The sarcomatoid variant was also found to be commoner (2.7%) when compared with earlier studies in the region.

The aim of this study is to assess how the histological subtypes of RCC vary in each of the ethnic groups in Singapore, as these subtypes have been shown to contribute to the outcome of the disease.

Patients and methods

This is a retrospective study of the histological subtypes of RCC cases treated in Singapore General Hospital (SGH) over a ten-year period (2001–2010). The data and permission for the study were obtained from the Singhealth Centralized Institutional Review Board (CIRB, Ref: 2009/1053/D). The content of the data obtained included the ethnicity categorized as Chinese, Malays, Indians and others (Indonesians, Vietnamese and other minor groups). Other data collected included age, gender and the histological subtype categorized as clear cell, papillary, chromophobe, collecting duct and unclassified subtypes. The mean follow-up period and survival outcome were also recorded. Tumor staging was based on the widely accepted 2002 TNM classification. The data were analyzed using the Statistical Package Service Solution (SPSS) software version 17.0. Chi Square and *z*-tests were used where appropriate; a p value <0.05 was considered significant.

Results

The total number of patients diagnosed with RCC between 2001 and 2010 was 752. Out of these, 76 patients did not have any or had no complete histopathological report and were excluded from the study, thus leaving a total number of 676 patients. The Chinese accounted for 80.8% and the Malays for 6.5%, while the percentage of the Indians and other minor groups studied was 4.6% and 8.1%, respectively. The mean age (SD) at presentation was 58.1 (12.1), 57.6 (10) and 55.1 (9.6) years for the Chinese, Indians and Malays, respectively. The male to female ratio was 2:1 in the general population.

The results of the study also revealed that the commonest histological variant in each of the ethnic groups, irrespective of sex, was clear cell carcinoma. It accounted for 79.7% of all the histological subtypes found among the Chinese, for 70.5% in the Malays, for 77.4% in the Indians and for 70.9% in the other ethnicities studied (Table 1). This was followed by papillary carcinoma (11.9%) in the Chinese population and papillary carcinoma in conjunction with unclassified subtypes in the Indians (9.8% each). For the Malays and the other ethnic minorities in Singapore the unclassified histological subtype represented the second most common category (Table 1).

The sarcomatoid histological subtype was found in 29 patients (4.3%) with RCC, with the highest prevalence found in the Chinese ($n=20$; 68.9%). The majority of the sarcomatoid variants ($n=16$; 55.1%) was associated with the clear cell subtype (Table 2). All the studied ethnic groups mainly presented with stage-I disease which accounted for 77.4%, 63.6% and 59.2% of all cases in the Indians, Malays and Chinese, respectively. The second most predominant stage was stage II (18.5%) in the Chinese, stage III (18.2%) in the Malays and stage IV (12.9%) in the Indians. The mean follow-up period was 3 years, with a maximum duration of 10.3 and a median duration of 2.3 years. The overall mortality rate was highest (24%) in the Malays, while the mortality rates in the Indians and the Chinese accounted for 19.4% and 19.5%, respectively. Most of the deaths (68%) recorded among those with complete records (18.5%) were attributed to RCC. The cancer-specific death rate was 70% for the Malays, 64.1% for the Chinese and 33.3% for the Indians.

When cancer specific deaths within the ethnic groups were distributed according to the disease stage, more Chinese (45.4%) and