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ORIGINAL ARTICLE

Malignant renal tumours seen in the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria

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ABSTRACT

Introduction: Malignant renal tumours (MRTs) pose significant morbidity and mortality. In adults, renal cell carcinoma (RCC) constitutes about 90% of these tumours whereas in children, the majority are nephroblastomas. Males are generally more affected than females. Nuclear grade, tumour stage, size and histopathological subtype are prognostic factors. In our environment, patients with MRTs commonly present late.

Methods: Clinical and demographic details of patients who had malignant tumours diagnosed on renal biopsy tissue between 2002 and 2013 at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria, were extracted from pathology request forms. Slides were retrieved from the archives and reviewed. The tumours were classified according to WHO and ISUP criteria.

Results: Kidney biopsies constituted 0.8% of the biopsy specimens processed within the period; 60% of these were malignant lesions. Half (51%) of the patients with MRTs were males and 81% were children (the majority aged 0–4 years). Among children, the incidence decreased steadily with age. Seventy-three percent were nephroblastomas, exclusively occurring in children. Renal cell carcinoma constituted 19.4%, with papillary carcinoma being the commonest subtype, whereas non-Hodgkin's lymphoma and rhabdomyosarcoma constituted 6% and 1.5%, respectively. The mean gross weight of the tumour masses was 1.3 kg and the average duration of symptoms prior to presentation was 18.3 months. The majority presented with abdominal masses.

Conclusions: Although the renal biopsy rate is generally low in our environment, we found that the most common renal malignancy was nephroblastoma in children. In adults, renal cell carcinoma, mainly of the papillary type, was predominant. Most cases present late.

Keywords: Malignancy; nephroblastoma; renal cell carcinoma; Port Harcourt; Nigeria.

INTRODUCTION

Malignant renal tumours (MRTs) are the third-most common genitourinary malignancies in adults [1,2], constituting about 3% of all human malignant tumours. They are predominantly primary, often arise from the renal parenchyma and pelvis, and are commonly of epithelial origin. The majority are adenocarcinomas, and referred to as renal cell carcinoma (RCC). In adults, RCC constitutes about 90% of MRTs whereas in children the majority are nephroblastomas (Wilms' tumour).

RCC is the 15th-most common cancer worldwide with high incidence rates in Europe and North America and lower incidence rates among Africans and Asians. The risk factors include cigarette smoking, obesity and hypertension [2-4]. Increased risk of renal carcinoma is associated with high parity among women, especially those who gave multiple births at a young age [5]. Long exposure to chemicals such as asbestos, lead and polycyclic aromatic hydrocarbons also confers increased risk [6]. While physical inactivity is associated with the risk of renal carcinoma, alcohol consumption is said to confer protection [7,8]. Fluid intake from beverages including coffee, tea and soda demonstrates no association with renal carcinoma [9].

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The rate of gender involvement varies according to geographic region but males are generally more often affected than females. For example, the incidence among males across Europe is more than five times that of females, whereas in Nigeria there is more male involvement but not with as wide a margin as recorded in European reports [10-14]. A few local authors have reported a greater prevalence in women [15,16].

Fuhrman nuclear grade, tumour stage, size and histopathological subtype are important prognostic factors in RCC [12,17]. Clear cell renal cell carcinoma has a worse prognosis when compared with chromophobe or papillary subtypes [17]. While early stage, small, and organ confined tumours are increasingly diagnosed in developed countries, late stage, large and non-organ confined tumours are commonly encountered in Nigeria owing to late presentation and poor radiodiagnostic infrastructure to evaluate patients [12,15].

Although previous reports indicate that MRTs are uncommon in Nigeria, there is need for periodic review to ascertain the trends and plan appropriately [11,12]. This study, which reviews MRTs between 2002 and 2013, is a follow-up to the one conducted in our centre between 1990 and 2001 [11].

METHODS

This was a retrospective study carried out in the Department of Anatomical Pathology department of the University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Nigeria. UPTH is the foremost tertiary health institution in the Niger Delta region, with adequate and competent urological and paediatric surgery staff. It serves a large patient population drawn from the Delta region in general and more specifically from Rivers state. The study covered the period 2002 to 2013. Information on patients whose kidney biopsies were diagnosed as malignant in the histopathology laboratory were extracted; this included clinical and demographic details from patient request forms and the department's accessioning register. Relevant slides were retrieved from archives and reviewed. Where necessary, new slides were made from formalin-fixed, paraffin-embedded tissue blocks and stained with haematoxylin and eosin. The tumours were classified accordance to the WHO histological criteria. The data were analysed using SPSS version 20.

RESULTS

During the 12-year review period (2002–2013), 112 kidney biopsies were received, constituting 0.8% of the 14 564 specimens processed. Of these, 67 cases (60%) were malignant lesions while 45 cases (40%) were non-neoplastic. The 67 patients with malignant tumours all underwent radical nephrectomies.

Approximately half of the patients (34, 51%) were males (Table 1). Children and adolescents aged between 0–19 years constituted 54 cases (81%) and adults the remaining 13 cases (19%) (Table 2). The bulk of childhood malignancies were seen in children under 10 years old (46 cases, 85% of this group) with those aged 0–4 years contributing 29 of these cases. Overall, among children the incidence decreased steadily with increasing age whereas in adults the incidence increased with age, peaking at 50–59 years (Table 3).

The majority of the tumours were nephroblastomas (73%) and ages 0–4 carried the greatest burden (54%) (Table 3). Renal cell carcinoma constituted only 13 cases while non-Hodgkin's lymphoma and rhabdomyosarcoma followed with 4 cases (6%) and 1 case (1.5%), respectively. Nephroblastoma occurred exclusively in children whereas the

Table 1. Overview of the renal malignancies and their gender distribution.

	Malignant type	Male	Female	Total (%)
1	Nephroblastoma	23	26	49 (73%)
2	Papillary RCC	5	1	6 (9%)
3	Clear cell RCC	2	3	5 (7%)
4	NHL (Burkitt's)	3	1	4 (6%)
5	Collecting duct carcinoma	0	1	1
6	Rhabdomyosarcoma	1	0	1
7	TCC	0	1	1
	Total	**34**	**33**	**67 (100%)**

RCC, renal cell carcinoma; NHL, non-Hodgkin's lymphoma; TCC, transitional cell carcinoma.

Table 2. Age distribution of childhood renal malignancies.

Age	Nephroblastoma	NHL	RCC	Total (%)
0–4	29	0	0	29 (54)
5–9	13	2	0	15 (28)
10–14	3	2	1	6 (11)
15–19	4	0	0	4 (7)
Total	**49**	**4**	**1**	**54 (100)**

RCC, renal cell carcinoma; NHL, non-Hodgkin's lymphoma.

Table 3. Age distribution of adult renal malignancies.

Age	Papillary carcinoma	Clear cell carcinoma	Collecting duct carcinoma	Transitional cell carcinoma	Rhabdomyo-sarcoma	Total (%)
20–29	2	-	-	-	-	2 (15)
30–39	1	2	-	-	-	3 (23)
40–49	-	2	1	-	-	3 (23)
50–59	2	1	-	1	1	5 (39)
≥60	-	-	-	-	-	-
Total	**5**	**5**	**1**	**1**	**1**	**13 (100)**

Table 4. Malignancy types and side of involvement

Lesion	Right	Left	Unknown	Total
Nephroblastoma	17	7	25	29 (54)
Renal cell carcinoma	6	1	6	15 (28)
NHL	-	1	3	6 (11)
Rhabdomyo-sarcoma	-	-	1	4 (7)
Total	**23 (34%)**	**9 (13%)**	**35 (52%)**	**67 (100%)**

Table 5. Frequency of presenting symptoms and signs.

Symptoms and signs	Number (%)
Abdominal mass	21 (31)
Persistent haematuria	3 (5)
Intermittent haematuria	3 (5)
Weight loss	15 (22)
Anaemia/weakness	7 (10)
Multiple combined symptoms	18 (27)
Total	**67 (100)**

other malignant lesions were found exclusively in adults. In decreasing order, the subtypes of RCC included papillary (6 cases), clear cell (5 cases), collecting duct (1 case) and transitional cell carcinoma (1 case).

Among patients with information on the side affected, the right kidney was involved 2.5 times more than the left (Table 4). The gross weight of the tumour ranged between 100 g and 5.5 kg with a mean of 1.3 kg and the gross dimensions ranged between 10 × 7 × 5 cm and 29 × 23 × 12 cm. The majority of the RCC cases were of the ISUP grade 2 type, whereas only one case each was of grades 1 and 4.

Among the nephroblastomas, there were no atypical cases noted. Most of the patients presented with an abdominal mass whereas haematuria was the least frequent presentation (Table 5). The average duration of symptoms prior to presentation was 18.3 months with a range of 1–2 years.

DISCUSSION

Kidney biopsies constituted 0.8% of the 14 564 specimens processed in the department within the 12-year period, with malignant tumours constituting only 67 cases (0.5%). UPTH serves a large patient population from the Delta region, and more specifically Rivers state. This suggests a relatively low incidence of malignant renal lesions in the region, which represents 5 of the 36 states that make up Nigeria. These findings are also consistent with previous reports that MRTs are uncommon in Nigeria [11,12,14, 18,19]. The known risk factors are not uncommon in Nigeria, especially in the Niger Delta region, where decades of poorly regulated oil and gas activities have led to pronounced air, water and land pollution [20]. It is therefore likely that the reason for the low prevalence is more genetic than environmental. This is in line with the observation by Stiller that the variation in patterns of incidence of Wilms' tumours along ethnic rather than geographical lines suggests that genetic disposition is important in its aetiology [21].

The issue of under-diagnosis and underreporting may also be important. Owing to the poor health infrastructure and the use of alternative solutions including spiritual healing and traditional medicine, a sizeable (but unknown) proportion of the populace do not present to hospitals.

It has been reported that the incidence of nephroblastoma in Africa is underestimated as some cases are not brought to the attention of medical personnel [22]. Furthermore, Tijani et al. have suggested that many cases present in an advanced, inoperable condition and histopathology is never

obtained [15]. In contrast, the incidence among Western countries has been on the increase partly due to early diagnosis brought about by routine medical examinations as well as the availability of modern health-care facilities with state-of-the-art radiological diagnostic equipment.

Children and adolescents aged between 0–19 years constituted 81% of the cases in our study. This predominance of MRTs among children is consistent with the report of a similar study conducted a decade earlier by Seleye-Fubara et al. in our institution [11]. Similarly, Mandong, in Jos and Isa et al. in Sokoto, observed a predominance of MRTs among children with nephroblastoma accounting for 57% and 48% of MRTs in Jos and Sokoto, respectively [10,14]. The marked preponderance of MRT among children is a cause for concern and sharply contrasts with findings in Western countries and in Pakistan, where more adults are involved [14]. There are no clear reasons for this difference but it is possible that environmental influences, such as environmental pollution, and genetic factors are involved.

The gender ratio in this study was balanced as only 34 of the 67 cases were males. Results from previous Nigerian studies have been inconsistent, with some researchers observing more males and others more females [10–16]. The previous study conducted in our centre a decade earlier indicated only a marginal predominance of males, with a male: female ratio of 1.6:1, comparable to the 1.2:1 reported by Orlu-Eddo et al. in Benin [11,19].

Of the childhood renal malignancies in this study, ages 0–4 years were most affected, constituting 53% of childhood cases. Nephroblastoma, which is the most common childhood tumour and relatively uncommon in adults, was by far the most common malignant renal lesion in this study. This is consistent with the literature. According to cancer research in the UK, around 85 cases of kidney cancer are diagnosed each year in children (0–14-year-olds), with around three-quarters of these occurring in those under the age of five [14,28]. Patients under 2 years of age have significantly fewer metastases and a better 5-year survival rate than those older than 2 years.

Our patients do not enjoy such a good prognosis despite their young age owing to factors such as late presentation, poor care and suboptimal management related to inadequate treatment infrastructure. The gross weight of the tumours ranged between 100 g and 5.5 kg with a mean of 1.3 kg and the gross dimensions ranged between 10 × 7 × 5 cm and 29 × 23 × 12 cm. Larger tumours have a worse prognosis and indicate late presentation. Reports from similar studies corroborate this finding that late stage, large and non-organ confined tumours are commonly encountered among Nigerian patients [12,14,16].12, 14, 16

In contrast, the average tumour size reported in most developed societies ranges from 5–8 cm (average 5.4 cm) and less than 0.5 kg in weight [25]. This speaks to the poor societal health culture complicated by poor infrastructure in the health sector, lack of social security and pervading poverty among the populace.

None of the nephroblastoma cases met the criteria for qualification as an atypical case. The criteria include marked nuclei enlargement of the blastemal, epithelial, or stromal cell lines, obvious hyperchromasia of the enlarged nuclei and multipolar mitotic figures [26].

RCC predominated among the adults with a 2:1 male:female ratio. This is consistent with the literature as a whole but contrary to the findings of Tijani et al. in Lagos and Isah et al. in Sokoto [14,15]. The peak age range was 50–59 years. This is consistent with earlier reports on RCC in the eastern and western parts of Nigeria [12,18]. It suggests that the peak incidence of MRT in Nigeria occurs earlier than the 50–70 years reported for Whites in the Unites States [27].

At the consensus conference of the International Society of Urological Pathology (ISUP) in 2012, a novel grading system (the ISUP grading system) was adopted, replacing the Fuhrman grading system. ISUP grade 1 tumours are defined as having inconspicuous, or absent, nucleoli at 400x magnification; for ISUP grade 2 tumours, nucleoli should be distinctly visible at 400x, but inconspicuous or invisible at 100x magnification; and for ISUP grade 3 tumours, nucleoli should be distinctly visible at 100x magnification. ISUP grade 4 tumours include those with rhabdoid or sarcomatoid differentiation or containing giant cells or showing extreme nuclear pleomorphism with clumping of chromatin [28]. The majority of our RCC cases were of the ISUP grade 2 with only one case each of grades 1 and 4.

Abdominal mass, weight loss and haematuria were the most common presenting features. This agrees with the classic triad of loin pain, abdominal swelling and haematuria, which commonly denotes late-presenting lesions. Among patients with known side of involvement, the right kidney was involved 2.5 times more than the left. In contrast, Badmus et al. observed more cases on the left side (55%) [12]. We are not aware of any clinical implications of the side of involvement.

CONCLUSIONS

In our study, we found that the most common renal malignancy was nephroblastoma in children. In adults, renal cell carcinoma, mainly of the papillary type, predominated. In most cases, patients present late.

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