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## CLINICOPATHOLOGICAL ASSESSMENT OF RENAL TUMORS IN A SAMPLE OF ADULT IRAQI PATIENTS

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#### ABSTRACT

Introduction: The kidney can develop both benign and malignant neoplasms. The most deadly of all urologic cancers is renal cell carcinoma (RCC), which makes up 2% to 3% of all adult malignant neoplasms. Method: A cross-sectional study was conducted over the period from January 2017 to December 2023, which includes a retrospective analysis of 109 randomly selected patients with kidney tumors who were collected from the Pathology Departments of Ghazi Al-Harreri Surgical Specialties Teaching Hospital and the study was concluded in five months. Results: Benign cases made up 7.3% of the study population, while malignant cases accounted for 92.7%, with more malignant cases in males, a mean age of patients with malignant lesions of  $51 \pm 13$  years, and a mean size of patients with malignant lesions of  $7 \pm 0.5$  cm. Regarding malignant cases, most tumors were in Grade II (52.5%) and Stage III (50.5%). lymhovascular invasion is not identified in the majority of patients (76.5%). A notable proportion had perinephric fat involvement (33.0%) and necrosis or sarcomatoid or rhabdoid features identified in (33.0%). Clear cell type RCC and papillary RCC were significantly more prevalent in tumors smaller than 7 cm in size, while chromophobe RCC was more common in tumors bigger than 7 cm. Regarding benign tumors, angiomyolipomas were found in 6 out of 8 cases (75%), while oncocytomas were found in 2 cases (25%). Conclusion: Malignant tumors make up the bulk of renal tumors. Individuals under 40 were more likely to have benign tumors, while individuals over 40 were more likely to have malignant tumors. Males were more likely to have malignant tumors. The most frequent benign tumor is angiomyolipoma, and the most common malignant tumor is clear type RCC. Malignant tumors are typically larger than 7 cm, whereas benign tumors are more likely to be smaller than that.

KEYWORDS: Clinicopathological, kidney tumors, Iraqi patients. Renal cell carcinoma.

#### INTRODUCTION

Renal tumors are a broad category of neoplastic lesions that exhibit patterns that differ somewhat across adult and pediatric patients. Adult kidney tumors are uncommon in people under 40 years old. Tumors that are benign or malignant can originate from many parts of the kidney tissue, particularly the tubular epithelium.<sup>[1]</sup> Carcinoma of the kidneys is the third most common urological cancer after bladder and prostate cancer, accounting for 3% of all adult malignant tumors. There are roughly twice as many men as women in the sex ratio. Men and women are diagnosed at median ages of 67 and 70, respectively.<sup>[2][3][4]</sup> Renal cell carcinoma (RCC) represents roughly 3% of all adult malignancies and is the most common kind of kidney cancer. Renal cell carcinoma (RCC) is usually diagnosed by a combination of imaging modalities and clinical

assessment, with histological investigation serving as the final step for conclusive validation. Numerous parameters, including as tumor stage, grade, histological subtype, and patient demographics, influence the prognosis and clinical therapy.<sup>[5]</sup> Over 50% of RCCs are unintentionally found, renal mass identification at random has greatly increased after routine imaging for a variety of illnesses.<sup>[6]</sup> Clear cell renal cell carcinoma (ccRCC), papillary renal cell carcinoma (PRCC), and chromophobe renal cell carcinoma (ChRCC) are the most prevalent histological subtypes of RCC. Out of all the histological subtypes of renal cell carcinoma, Clear cell renal cell carcinoma (ccRCC) accounts for 75% of cases and is the most prevalent kind.<sup>[7]</sup> Along with advances in electron microscopy, immunohistochemistry, cytogenetics, and molecular diagnostics, the classification system of renal cell carcinomas (RCCs) has

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Formalin-fixed paraffin-embedded tissue blocks were

collected. Then, sections 4-6 microns stained routinely

with Hematoxylin & Eosin and the diagnosis was revised

by two pathologists. All statistical analyses were

performed utilizing SPSS, version 2 and including mean,

standard deviation, frequency and percentage using Yates

Chi square with p. value <0.05 regarded as statistically

The total number of cases in the study was 109. Table 1

shows that benign cases made up 7.3% of the study

population overall (angiomyolipoma shown in (figure

4.8) and renal oncocytomas shown in figure (4.9), whereas malignant cases accounted for a far higher

percentage, accounting for 92.7% of the total number of

cases. Table 2 shows the distribution of renal tumors

according to study variables. Table 3 shows significant findings in gender distribution, with more malignant cases in males, mean age of patients with malignant

lesions 51  $\pm$  13 years and mean size of patients with

malignant lesions  $7 \pm 0.5$  cm. Table 4 presents the

distribution of patients with malignant diagnosis

according to several study variables; it shows that most

cases are in Grade II (52.5%) and Stage III (50.5%).

lymphovascular invasion is not identified in (76.5%), A notable proportion had perinephric fat involvement

(33.0%) and necrosis or sarcomatoid or rhabdoid features identified in (33.0%) of cases. **Table 5** compares tumor characteristics between patients with tumors  $\leq 7 \pm 0.5$  cm

and >7 cm. it shows that larger tumors (>7  $\pm$  0.5 cm)

tend to have more aggressive characteristics, including

involvement of perinephric fat and necrosis/sarcomatoid

features, indicating a worse prognosis.

grades, advanced stages, and increased

significant.

RESULTS

expanded. Certain malignancies are identified by their molecular features, such as ALK rearrangementassociated RCC, renal carcinomas with MiT family translocation, renal cancer with SDH deficiency, or RCC with FH deficiency.<sup>[8]</sup> Prognostic importance is associated with histologic subtypes, although mostly at the extremes of the spectrum, a bad prognosis is indicated by the presence of renal medullary carcinoma, collecting duct carcinoma, sarcomatoid differentiation, or an unclassified histologic subtype.<sup>[6]</sup> The kidney can also host benign tumors such as angiomyolipoma, papillary adenoma, mixed epithelial and stromal tumor, and Oncocytoma. The majority of benign renal tumors might be mistaken for more malignant renal neoplasms.<sup>[9][10]</sup>

This study aims to assess adult benign and malignant renal tumors in a sample of Iraqi patients in correlation with histopathological diagnosis.

## Method

A cross sectional study was conducted over the period from January 2017 to December 2023, which includes a retrospective analysis of 109 randomly selected patients with kidney tumors which were collected from Pathology Departments of Ghazi Al- Harreri Surgical Specialties. For each case the histopathological reports and slides were collected, reexamined, and retrospectively reviewed.

The clinic-pathological data that were collected from patients pathology reports included (age, gender, size, side, tumor subtypes, grade and pathological stage).

## Inclusion criteria

Adult patients with kidney tumors.

#### **Exclusion Criteria**

Retroperitoneal tumors and tumor of renal pelvis.

Table 1:	Distribution	of patients	according	diagnosis	(benign V	/S malignant).
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Variables		Frequency	Percentage
Diagnosis (general)	Benign	8	7.3
	Malignant	101	92.7
Total		109	100.0

higher

#### Table 2: Distribution of renal tumors according to study variables.

Variables		Frequency	Percentage
Gender	female	42	38.5
	male	67	61.5
Age groups	20-29	6	5.5
	30-39	13	11.9
	40-49	29	26.6
	50-59	27	24.8
	60	34	31.2
Types of lesions	angiomyolipoma	6	5.5
	chromophobe RCC	9	8.3
	clear rcc	68	62.4
	omcocytoma	2	1.8
	papillary RCC	20	18.3

	rcc collecting cell type	2	1.8
	Rcc sarcomatoid varient	2	1.8
Site	lower	30	27.5
	mid and lower pole	4	3.7
	middle	16	14.7
	upper	41	37.6
	upper and middle pole	7	6.4
	whole kidney	11	10.1
Side	bilateral	1	0.9
	left	54	49.5
	right	54	49.5
Size	7cm	71	65.1
	>7cm	38	34.9
Total		109	100.0

## Table 3: Association between diagnoses (Benign VS Malignant) and other variables.

Diagnosis					
Benign			Malignant	r-value	
	20.20	1	5		
	20-29	12.5%	5.0%		
	20.20	3	10		
	30-39	37.5%	9.9%		
Age	40.40	2	27	0.9	
Groups	40-49	25.0%	26.7%	0.8	
_	50 50	2	25		
	50-59	25.0%	24.8%		
	(0)	0	34		
	00	0.0%	33.7%		
		6	36		
Call	Females	75.0%	35.6%	0.05	
Gender	N I	2	65	0.05	
	Iviales	25.0%	64.4%		
	Ι	4	26		
	Lower	50.0%	25.7%		
	mid and lower note	0	4	0.6	
	find and lower pole	0.0%	4.0%		
Site	Middle	1	15		
Sile		12.5%	14.9%		
	Upper	3	38		
		37.5%	37.6%		
	upper and middle note	0	7		
	upper and middle pole	0.0%	6.9%		
	whole kidney	0	11		
	lower	0.0%	10.9%		
	~7	5	66		
Tumor Sizo	$\geq$ /	62.5%	65.3%	1 000	
Tumor Size	>7	3	35	1.000	
	>1	37.5%	34.7%		
Laterality	Bilatoral	0	1		
	Dilateral	0.0%	1.0%		
	Laft	1	53	0.8	
	Leit	12.5%	52.5%	0.8	
	Dight	7	47		
	Kigiit	87.5%	46.5%		

Table 4: distribution of malignant cases according to study variables.

Variables		Frequency	Percentage
Grade (n 101)	Ι	17	17.2
	II	52	52.5
	III	13	13.1
	IV	17	17.2
Stage (n 101)	Ι	39	39.4
	II	7	7.1
	IIII	50	50.5
	IV	3	3.0
lymphovascular invasive (n 98)	not identified	75	76.5
	Identified	23	23.5
Perinephric fat involvement(n 97)	Involved	32	33.0
	not involved	65	67.0
Adrenal gland involvement (n 97)	involved	1	1.0
	not involved	96	99.0
presence of necrosis or sarcomatoid or rhabdoid features	Identified	33	33.0
	not identified	67	67.0

Table 5: Association between the size of the tumor and other variables.

Size				
≤7 ± 0.5 cm			>7± 0.5 cm	<b>P-value</b>
	shares which a DCC	2	7	
	спготорнове ксс	3.0%	20.0%	
		44	24	
	clear rcc	66.7%	68.6%	
Histological Types		17	3	0.015
(n 101)	papillary RCC	25.8%	8.6%	0.017
		2	0	
	collecting duct ca	3.0%	0.0%	
		1	1	
	Rcc sarcomatoid variant	1.5%	2.9%	
	-	12	5	
	1	18.2%	14.3%	
		40	13	
Grade	Ш	60.6%	37.1%	
(n 101)		6	7	0.04
	111	9.1%	20.0%	
	IV	8	10	
		12.1%	28.6%	
	I	40	1	
		60.6%	2.9%	
	П	2	5	
Stage		3.0%	14.3%	
(n 101)	III	24	26	0.0001
		36.4%	74.3%	
	IN/	0	3	
	10	0.0%	8.6%	
		51	24	
lymphoVascular	not identified	81.0%	68.6%	0.2
invasion (n 98)	· 1	12	11	0.2
	Identified	19.0%	31.4%	
Perinephric fat (n 97)	·	13	19	
	involved	20.6%	55.9%	0.0001
	not involved -	50	15	
		79.4%	44.1%	
Adrenal gland	involved	0	1	0.24
		0.0%	3.0%	0.34

	not involved	64	32	
		100.0%	97.0%	
	Identified -	15	18	
necrosis or sarcomatoid or rhabdoid features		23.1%	51.4%	0.007
	not identified	50	17	0.007
	not identified	76.9%	48.6%	



Figure 1: Clear cell type renal cell carcinoma: grade 2, with solid and trabecular pattern, tumor cell separated by a small amount of vasculature and inconspicuous nucleoli at 10x H&E stain magnification (A). At 40x H&E stain magnification, however, the nucleoli are noticeable and slightly eosinophilic (B).



Figure 2: Chromophobe-type RCC section displaying acidophilic granular cells with a perinuclear halo (H&E stain, 40X).



Figure 3: Angiomyolipoma section displaying smooth muscle (green arrow), thick wall blood vessels (red arrow), and mature adipocytes (blue arrow) (10x, H&E stain).



Figure 4: Oncocytoma displaying small solid nests of large, round cells in loose connective tissue (40x B, H&E stain).

## DISCUSSION

In this study we found that benign tumors constitute only 7.3% of renal tumors and the majority was Malignant (92.7%). Latif et al (2011) in his study also found that malignant diagnoses in renal tumors outnumbered the benign diagnoses.<sup>[11]</sup> Malignant tumors constituted (90.4%) of renal tumors in an Indian study conducted by **Bhavya and Krishnan (2018).**<sup>[9]</sup> Xiong et al. (2010) found that 89.8% of Chinese patients had malignant tumors.<sup>[12]</sup> **Bashir N et al. (2015)** found that 89.13 percent of patients in India had malignant tumors.<sup>[13]</sup>

**Violette et al. (2012)** conducted a study in Canada and found that 90.5% of patients had malignant tumors.<sup>[14]</sup>

Age-wise, benign tumors were more common in patients under 40, whereas malignant tumors became more prevalent in patients over 40, and benign tumors vanished in patients over 60, Mean age of patients with malignant lesions 51 years. This result is close with **Bhavya and Krishnan (2018).**<sup>[9]</sup> study that indicated patients with benign tumors had an average age of 45 years, whereas those with malignant tumors had an average age of 52 years. & **Kyei MY et al. (2015)** study in Ghana discovered that individuals with malignant kidney tumors were 52.2 years old on average.<sup>[15]</sup> In Basra/Iraq, **Mohsin and Yousif (2011)** found that the age range of 40–60 years old has the highest incidence for malignant renal tumors.<sup>[16]</sup>

In regard to gender, females were more likely to have benign renal tumors while males had malignant tumors (p value 0.05). A study conducted at the Cleveland Clinic on by **Kyei et al. (2008)** on 488 cases revealed that women had a lower incidence of malignant lesions than men.<sup>[15]</sup> This finding was also supported by several other studies like **Yıldız et al. (2024)**<sup>[17]</sup> study discovered that the rate of benign pathology was much greater in female sex (63%) (p = 0.004) and **Fiev et al (2023)** research discovered a link between sex and kidney malignancy in men.<sup>[18]</sup> This result could be influenced by hormonerelated factors.<sup>[19]</sup>

We found that for malignant cases grade II nuclei were more common (52%), similarly to these results, a study conducted in Saudi Arabia by **Albasri et al**. in 2017 noted that 68% of the cases in had Grade II characteristics.<sup>[20]</sup> A study conducted in 2011 in Pakistan by **Latif et al (2011)**, found that the majority of cases had Grade II (63.3%) and Grade III tumors (20%).<sup>[11]</sup> On the other hand A study conducted in 2013 by **Aiman A et al**. found that grade III was more common.<sup>[21]</sup>,

In the current investigation, stage III (47.3%) was the most common stage for all malignant tumors. Similar to the findings of **Gudbjartsson et al.** (2005), a study conducted in Iceland showed 59.3% at stage III.<sup>[22]</sup> Eissa A et al. (2014) conducted a study in Hilla, Iraq, and reported stage III (36.7%)<sup>[23]</sup>, and Latif et al. (2011) conducted a study in Pakistan, reporting stage III (36.5%), followed by stage I (31.7%).<sup>[11]</sup>

In our study perinephric fat involvement was detected in 33% of malignant cases and vascular invasion in 23%. **Violette et el. 2012**, study in Canada which showed perinephric fat invasion was in (16%).<sup>[14]</sup> **Turun et el. 2012**, study reported 27% renal vascular invasion<sup>[24]</sup>; **BrookmanMay, et el. 2015**, study reported 14% perinephric fat invasion, and 2.9% renal vein invasion.<sup>[25]</sup>

Necrosis was identified in 33% of malignant cases in this research. Compared to an American study by **Frank et** 

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al. (2002).<sup>[26]</sup> And 43% in a study by Lam et al. (2013).<sup>[27]</sup> And according to According to a 2011 study by Sidharth et al(2011), 40% of cases had necrosis.<sup>[28]</sup>

Regarding size, this study revealed that benign tumors are more likely to be smaller than 7cm while malignant tumors are usually bigger than 7 cm. mean size of patients with malignant lesions was  $7 \pm 5$  mm. in a study conducted by **Latypov et al**, (2022) Malignant renal tumors had an average size of 6.5 cm, and larger tumors (>7 cm) had a poorer five-year survival rate than tumors  $\leq 4$  cm.<sup>[29]</sup> And according to Wei et al (2012), the mean size for malignant renal tumors in the study was 5.02 cm, ranging from 1 to 20.5 cm.

In the current study, Clear cell type RCC and papillary RCC were significantly more prevalent in tumors smaller than 7 cm in size, while chromophobe RCC was more common in tumors bigger than 7cm. similarly to this finding, a research published by Beck et al (2004), showed that the average tumor diameters were 5.6 cm for clear cell RCC, 4.8 cm for papillary RCC, and 7.1 cm for chromophobe RCC. Out of the three histological subtypes, the mean tumor size was highest in chromophobe RCC. Wand et al (2017) in their study stated that clear cell papillary RCC usually presents with smaller mean size compared to clear cell RCC and chromophobe RCC.<sup>[30]</sup> While the study of **Williamson et** al (2013) on clear cell papillary RCC found that the mean size of clear cell RCC was 2.8 cm, the mean size of papillary RCC was 2.5 cm, and the mean size of chromophobe RCC was 3.3 cm.<sup>[31]</sup>

We found that larger tumors (>7 cm) tend to have more aggressive characteristics, including higher grades, advanced stages, and increased involvement of perinephric fat and necrosis/sarcomatoid features. This finding is supported by Li et al study (2022) which indicated that the likelihood of aggressive traits increases with tumor size, with larger tumors having a higher likelihood of displaying aggressive features including higher grades and advanced stages.<sup>[32]</sup> Another study by Bhindi et al (2018) found that with increasing tumor size, the estimated percentages of aggressive histology and any malignant histology increased. In particular, the estimated risk of malignancy for tumors measuring 2 cm, 3 cm, and 4 cm is 84%, 87%, and 88%, respectively. The estimated likelihood of aggressive histology is 18%, 24%, and 29%, respectively.<sup>[33]</sup>

Regarding benign tumors, in this study, angiomyolipoma 6 out of 8 cases (75%) was the most common benign tumor followed by oncocytomas 2 cases (25%). According to **Chako et al (2023)**, In adult primary renal mesenchymal neoplasms, 90% of benign cases are classical angiomyolipomas, the most frequent benign renal tumors.<sup>[34]</sup> **Padmanabhan et al (2016)** found that angiomyolipoma (10%) was the most prevalent benign kidney tumor, followed by oncocytoma, metanephric adenoma, and renomedullary interstitial tumor (1.66%

each).<sup>[35]</sup> While **Kim et al (2020)** found in their metaanalysis study that oncocytoma (23.5%) and angiomyolipoma (20.6%) are the most common benign kidney tumors following partial nephrectomy.<sup>[36]</sup>

## CONCLUSION

Malignant tumors make up the bulk of renal tumors. Individuals under 40 were more likely to have benign tumors, while individuals over 40 were more likely to have malignant tumors. Males were more likely to have malignant kidney tumors than benign ones. The most frequent benign tumor is angiomyolipoma, and the most common malignant tumor is clear type RCC. Malignant tumors are typically larger than 7 cm, whereas benign tumors are more likely to be smaller than that. Clear cell type RCC and papillary RCC are more prevalent in tumors smaller than 7 cm in size, while chromophobe RCC was more common in tumors bigger than 7cm.

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