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Clinical Pattern of Renal Diseases among Children Admitted to Fayoum University Children's Hospital

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Abstract:

Introduction: The incidence of pediatric kidney disorders varies across developing and developed nations. Pediatric renal disorders often have minor symptoms at first, making early diagnosis challenging.

Aim of the study: To describe the existing pattern of pediatric renal illnesses among patients admitted to Fayoum University Children's Hospital between June 2022 and June 2023, as well as to investigate significant clinical features, risk factors, and associated outcomes.

Subjects and Methods: An observational retrospective study was employed in this investigation. This study covered all children with renal illnesses admitted to Fayoum University Children's Hospital between June 2022 and June 2023, ages ranging from 1 day to 12 years old, and both genders. The patient's age at presentation, gender, presenting symptoms, examination findings, laboratory investigation, results, and diagnosis were all obtained from the hospital's medical records.

Results: Out of the 6,000 patients admitted to Fayoum University Children's Hospital, 151 had renal disorders, accounting for 2.5%. The majority of these patients, 54.9%, were diagnosed with glomerular disorders, with nephrotic syndrome accounting for a greater percentage at 28.5%. Urinary tract infection followed, at 27.8%, and post-streptococcal glomerulonephritis (PSGN) at 13.9%.

Conclusions: In our study, glomerular disorders, particularly nephrotic syndrome, were the most prevalent renal disorders, followed by urinary tract infections.

Keywords: Urinary Tract Infection; Glomerulonephritis; Renal Disorders; And Nephrotic Syndrome.

1. Introduction

Worldwide, renal disorders are a major source of morbidity and mortality in children. This is especially true in developing nations, where several factors, including late presentation, inadequate diagnostics, and treatment options, lead to

high rates of renal diseases in children and poor outcomes [1].

Geographical location, Racial, environmental, and genetic factors all influence the pattern of pediatric renal disorders [2]. Any patient presenting with abrupt or persistent manifestations should have the possibility of renal illness recognized as part of their differential diagnosis [3].

Chronic kidney disease (CKD) still has a large worldwide burden, and treating patients with CKD is expensive, particularly if end-stage kidney disease (ESKD) develops. It is still essential to comprehend the epidemiology of chronic kidney disease in children to achieve worldwide equity in outcomes, early detection, and prevention of the illness's progression. The global illness burden is still significant, with an estimated 9% of people worldwide projected to have CKD as reported in 2017 [4]. Due to genetic and environmental variables, the severity of CKD varies from place to place. Due to the shortage of a national registry, the exact incidence and burden of CKD among children in Egypt remain unknown [5]. A better understanding of the prevalence of renal disorders in children in our setting could help inform future health policy decisions and raise awareness among the nation's medical professionals [6].

The study aimed to explain the current pattern of pediatric renal disorders among patients admitted to Fayoum University Children's Hospital between June 2022 and June 2023, as well as to examine clinical features, risk factors, and related outcomes.

2. Subjects and Methods

2.1 Subjects

Out of 6,000 children, 151 were included in this study. Their ages ranged from 1 day to 12 years old, and they were hospitalized at the Fayoum University Children's Hospital between June 2022 and June 2023.

Inclusion criteria

All children, of both genders and ages ranging from day 1 to 12 years, who were admitted to the Fayoum University Children's Hospital with renal disorders.

Exclusion criteria

Patients older than 12 years old, those with several congenital defects, those whose medical records are not comprehensive, and outpatients.

2.2 Study design

Observational retrospective study: Patient data, including age at presentation, gender, presenting symptoms, examination findings, laboratory investigation results, and diagnosis, were obtained from hospital medical records.

2.3 Statistical Methods

The statistical package for the social sciences (SPSS) software, version 22, was used on a Windows 7 computer to analyze the data.

3. Results

Renal diseases accounted for 2.5% (151 out of 6,000) of all hospital admissions at Fayoum University Children's Hospital over one year. Children in our study were, on average, 5.2±3.4 years old, with 57.6% being males and 42.4% being females. 80.7% of children came from rural areas, as shown in **Table 1**.

Table 1: Description of the study group's demographic Features.

Variables		Frequency (n=151)
Age (years)		5.2±3.4 (1 day -12 years)
Weight (kg)		19.1±10.2 (2-50)
Gender	Male	87 (57.6%)
	Female	64 (42.4%)
Residence	Rural Areas	122 (80.7%)
	Urban areas	29 (19.2%)

The average length of hospital stay was 8.7 ±5.2 days. A greater proportion of patients (51%) complained of fever, followed by edema (47%), oliguria (37.1%), and vomiting (30.5%), as seen in **Table 2.**

Table 2: Frequency of varying clinical findings within the study group.

Clinical data	Frequency (n=151)
Hospital stay (days)	8.7 ±5.2 (2-30)
Fever	77 (51%)
Edema	71 (47%)
Oliguria	56 (37.1%)
Vomiting	46 (30.5%)
Dysuria	26 (17.2%)
Gross Hematuria	26 (17.2%)
Hypertension	26 (17.2%)
Dehydration	8 (5.3%)
Polyuria	6 (4%)
Bloody diarrhea	2 (1.3%)

The most common organisms discovered in the urine cultures of the children who carried out this study were *Klebsiella* sp. (15.2%), followed by *Escherichia coli* growth (10.6%), as shown in **Table 3.**

Table 3: Frequency of disparate urine culture results within the research group.

Variables		Frequency
Urine Culture	Not done	71 (47%)
	No growth	24 (15.9%)
Bacterial Growth	*Klebsiella* sp.	23 (15.2%)
	Escherichia coli	16 (10.6 %)
	Pseudomonas sp.	4 (2.6%)
	Other organisms	13 (8.6%)

Out of the 11.3% of cases that required a renal biopsy, 3.3% had minimal change disease (MCD), 2% had acute diffuse proliferative glomerulonephritis with crescent formation, and 1.3% had Mesangioproliferative glomerulonephritis, Membranoproliferative glomerulonephritis (MPGN), and membranous glomerulopathy, as shown in **Table 4.**

Table 4: Frequency of Renal Biopsy Results in the Research Group.

Renal biopsy	Frequency
Not done	134 (88.7%)
MCD	5 (3.3%)
Acute diffuse proliferative GN with crescent formation	3 (2%)
Mesangioproliferative	2 (1.3%)
MPGN	2 (1.3%)
Membranous glomerulopathy	2 (1.3%)
Lupus nephritis	1 (0.7%)
IgA nephropathy	1 (0.7%)
FSGS	1 (0.7%)

MCD: Minimal change disease, MPGN: Membranoproliferative glomerulonephritis, FSGS: Focal segmental glomerulosclerosis

The glomerular abnormalities were diagnosed in 54.9% of patients (with a higher percentage for steroid dependent nephrotic syndrome (SDNS) and PSGN, whereas the tubular disorders, urinary tract infections (UTI), and obstructive uropathy were reported in 27.8%, 9.3%, and 7.9% of cases, respectively, as demonstrated by **Table 5**.

Table 5: Incidence of renal disorders among the study group.

Diagnoses		Incidience
Glomerular disorders (n=83) (54.9 %)	PSGN	21 (13.9%)
	SDNS	20 (13.2%)
	SRNS	9 (6%)
	CKD	8 (5.3%)
	RPGN	7 (4.6%)
	HUS	3 (2%)
	Frequent relapser NS	2 (1.3%)
	Infrequent relapser NS	2 (1.3%)
	Congenital nephrosis	1 (0.7%)
	Lupus nephritis	1 (0.7%)
UTI (n=42) (27.8 %)		42 (27.8 %)
Tubular disorders (n=14) (9.3%)	Intrinsic AKI	7 (4.6%)
	Renal tubular acidosis	4 (2.6%)
	Diabetes insipidus	3 (2%)
Obstructive uropathy (n=12) (7.9%)	PUV	7 (4.6%)
	Renal stone	3 (2%)
	PUJO	1 (0.7%)
	Neurogenic bladder	1 (0.6%)

SDNS: steroid-dependent nephrotic syndrome, SRNS: steroid-resistant nephrotic syndrome, RPGN: rapidly progressive glomerulonephritis, HUS: hemolytic uremic syndrome, AKI: acute kidney injury, PUV: posterior urethral valve, PUJO: pelvi ureteric junction obstruction.

The highest percentage of complications among the study group was for infections (10.6%), which included sepsis, cellulitis with DVT, spontaneous bacterial peritonitis (SBP), and infections from hemodialysis catheters. The second-highest percentage was for hypertensive encephalopathy (3.3%), followed by obstructive uropathy with CKD and obstructive uropathy with UTI (3.3%), as described in **Table 6**.

Table 6: Frequency of Complications Categories among the Study Group.

Complications	Frequency
No complications	120 (79.5%)
Hypertensive encephalopathy	5 (3.3%)
Obstructed uropathy with CKD	5 (3.3%)
Dilated cardiomyopathy	2 (1.3%)
Marked pleural effusion with chest tube	1 (0.7%)
Marked pericardial effusion	1 (0.7%)
Shock	1 (0.7%)
Infections	16 (10.6%)
Sepsis	7 (4.6%)
Obstructive uropathy with recurrent UTI	5 (3.3%)
Hemodialysis catheter infection	2 (1.3%)
Cellulitis with DVT	1 (0.7%)
SBP	1 (0.7%)

DVT: deep venous thrombosis, SBP: spontaneous bacterial peritonitis, UTI: urinary tract infection.

There was a statistically significantly higher percentage of UTI infections among females (p =0.01). However, obstructive uropathy and Glomerular disorders were statistically more common in males, as shown in **Figure 1**.

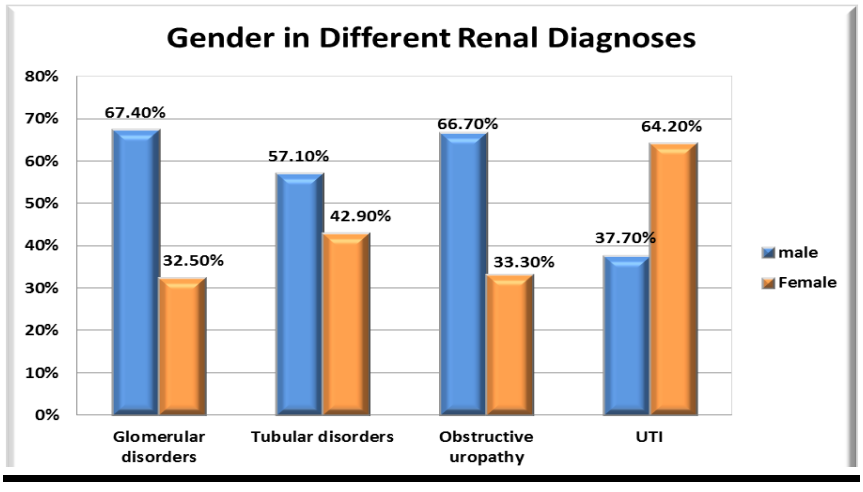

Figure 1: Gender in Different Renal Diagnoses.

Individuals with obstructed uropathy had a statistically higher percentage of complications than patients with other renal illnesses (p <0.001), as seen in **Table 7.**

Table 7: Comparisons of Renal Diseases Complications in Different Renal Diagnoses among the Study Group.

Diagnosis	Complications		*P*-value
	No (N=120)	Yes (N=31)	
Glomerular disorders (n=83)	70 (84.3%)	13 (15.6%)	<0.001*
UTI (n=42)	40 (95.2%)	2 (4.8%)	
Tubular disorders (n=14)	8 (57.1%)	6 (42.9%)	
Obstructive uropathy (n=12)	2 (16.7%)	10 (83.3%)	

**: significant*

The results of cases diagnosed with glomerular disorders and UTI had a statistically significant higher percentage of improving outcomes; while cases diagnosed with tubular disorders and obstructed uropathy required conservative treatment in 50% of cases; the corresponding mortality outcomes were 28.6% and 16.7%, respectively (p <0.001), as shown in **Table 8.**

Table 8: Comparisons of Final Outcomes in Different Renal Diagnoses among the Study Group.

Diagnosis		Outcomes					*P*-value
		Improved	Conservatives	Dialysis	Referred	Died	
Diagnosis	Glomerular disorders	39 (46.9%)	35 (42.1%)	8 (9.8%)	0 (0%)	1 (1.2%)	<0.001*
	UTI	37 (88%)	5 (12%)	0 (0%)	0 (0%)	0 (0%)	
	Tubular disorders	3 (21.4%)	7 (50%)	0 (0%)	0 (0%)	4 (28.6%)	
	Obstructive uropathy	2 (16.7%)	7 (58.3%)	0 (0%)	1 (8.3%)	2 (16.7%)	
Complications	No	78 (65%)	40 (33.3%)	2 (1.7%)	0 (0%)	0 (0%)	<0.001*
	Yes	3 (9.7%)	14 (45.2%)	6 (19.4%)	1 (3.2%)	7 (22.6%)	

**: significant*

4. Discussion

The pattern and outcomes of pediatric renal disorders at the tertiary care facility, Fayoum University Children's Hospital, are described in this study. 151 of the 6,000 children who were admitted throughout the research period had renal illness. With a prevalence rate of 2.5%, it was higher than the 1.15% reported by Roshdy et al [7], and lower than the 6.3% reported by Bhatta et al. in Nepal [8]. Methodological issues with the study's design and duration, sample size, and changes in the frequencies of renal diseases could have contributed to these variances.

Our study involved 151 children, of which 87 (57.6%) were boys and 64 (42.4%) were girls. The mean age of the study group was 5.2±3.4 years, ranging from 11 days to 12 years, with a male-to-female ratio of 1.3:1. In contrast, Anigilaje and Adesina reported that 163 out of 4327 had renal disorders; of these, 95 (58.3%) were male and 68 (41.7%) were female [9].

In our study, a greater proportion of cases (51%) presented with fever, followed by edema (47%), oliguria (37.1%), and vomiting (30.5%). In line with the findings of Garba et al., who stated that most of the children in the research had a history of fever and oliguria and that most of them were febrile and had facial edema when they were examined [1].

In our research, glomerular diseases accounted for 83 cases (54.9%) of renal disorders necessitating admission; these cases were primarily nephrotic syndrome, which accounted for 43 cases (28.5%), followed by UTI, which accounted for 42 cases (27.8%). This was contrary to Ajite et al.'s report from their index study, which stated that UTI was the most common renal disease among the various conditions seen, followed by acute kidney injury [10]. However, it was in line with Kotb et al.'s report that the most common renal disease in their study was nephrotic syndrome, which affected 40% of patients [11].

In females, the percentage of UTI was statistically significantly greater. This is mostly related to short urethra and personal hygiene; however, other diagnoses were made in males, such as glomerular disorders and obstructive uropathy. In our study, the causative organisms in UTI were Klebsiella in 23 cases (15.2%), *E. coli* in 16 (10.6%), *Pseudomonas* in 4 (2.6%), and other organisms in 13 (8.6%). In comparison, Ali et al found that *E. coli* was a causative

organism for UTI in 38.4% of cases, *Staphylococcus aureus* in 21.6%, Proteus in 13.4%, *Pseudomonas* in 10%, and *Klebsiella* in 18 % [12]. This difference may be related to the fact that we included cases only admitted to the hospital, not outpatient cases.

Nephrotic syndrome was the most prevalent glomerular disorder in our study, accounting for 28.5% of cases; SDNS made up 13.2% of cases, SRNS 6%, and SSNS 6%. According to Ahmad et al.'s findings, out of the 71 patients with Nephrotic syndrome, 90% responded to steroids and 10% did not [7]. With 13.9%, PSGN was the second most frequent glomerular disorder, followed by CKD at 5.3%, RPGN at 4.6%, and HUS.

According to Yadav et al., PSGN accounted for 33% of AGN, thereafter NS (26%), lupus nephritis (4%), and Henoch-Schoenlein purpura nephritis (0.8%) [13]. These discrepancies between our study and other studies may be due to the wide variability in genetic, cultural, and environmental factors [14].

The most prevalent urologic problem in our study was PUV, accounting for 58.3% of obstructive uropathy diseases, followed by renal stones. This is in contrast to research conducted in Iran by Dalirani et al., who found that the most common urologic problem in their study was neurogenic bladder [15].

Sepsis was the main cause of death in this study due to hospital-acquired infections, followed by ESRD that did not comply with dialysis due to the parents' ignorance of the importance of dialysis for life.

5. Conclusion

An observational retrospective study conducted over one year, from June 2022 to June 2023, revealed that 2.5% of patients admitted to Fayoum University Children's Hospital had renal illness. The most prevalent renal disease was nephrotic syndrome, particularly SDNS, followed by urinary tract infections and PSGN. PUV was the most prevalent congenital renal illness in our study.

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AI declaration statement: None declared.

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