SJIF Impact Factor: 6.711

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 8.
Issue: 10
Page N. 07-12
Year: 2024

Original Article www.wjahr.com

PREVALENCE OF CHRONIC RENAL FAILURE IN CHILDREN ADMITTED TO BENT AL - HUDA TEACHING HOSPITAL IN THI-QAR PROVINCE

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Article Received date: 28 July 2024 **Article Revised date:** 18 August 2024 **Article Accepted date:** 08 Sept. 2024

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ABSTRACT

Background: Chronic kidney disease is a devastating medical, psychological, social and economic problem for patients and their families. Aim of the study: determine the etiology, clinical presentation, and treatment modalities of CKD in children admitted to hospital. **Method:** A Retrospective study of all children with chronic kidney disease admitted to Bint Al-Huda teaching hospital in south of Iraq during the period from 1st of August 2023 to 1st of December 2023. **Results:** Under 15, the study comprised 57 CKD patients, 31 (54.4%) male and 26 (45.6%) female. Male 1.19:1. Their ages fall between 1 and 15 years. In this study, stage III or IV renal insufficiency makes around 70.2% of the cases. Affected 2 (3.5%) persons; followed by stage II 8 (14%), and end stage 7 (12.3%). stage I renal insufficiency. There were twenty-three (40.3%) patients aged 5–10 years. Congenital defects caused CKD in 26 (45.6%) people; glomerulopathies in 18 (31.6%) followed by idiopathic in 11 (19.3%). In 55 (96.4%), anaemia was the most common symptom; followed in 25 (43.8%) by failure to thrive and in 19 (33.3%) by acidotic breathing. Six (10.5%) had hemodialysis; two (3.5%) got peritoneal dialysis; and forty-nine (86%) got conservative medical treatment. **Conclusion:** More often in men, congenital anomalies were the main cause of CKD among our patients. Postnatal therapy depends critically on prenatal ultrasonic screening for urinary system problems. Mostly, our patients get conservative medical treatment.

KEYWORDS: Chronic Renal Failure, Children, Bent Al - Huda Teaching Hospital, Thi-Qar Province.

INTRODUCTION

Chronic kidney disease (CKD) is a progressive syndrome characterized by gradual, irreversible loss of kidney function, potentially leading to end-stage renal disease (ESRD).[1] Chronic renal insufficiency (CRI) progresses to end-stage renal failure, with varying rates of decline in glomerular filtration among different nephropathies and patients.[2] CKD and CRI describe renal dysfunction of varying severity, resulting from developmental, genetic, immunologic, metabolic, traumatic, or infectious processes. CKD significantly impacts children's lives, affecting behavior, relationships, self-esteem, concentration, and learning.[3] In the United States, ESRD incidence is notably high in children aged 0-4 years. Children under 20 years' account for less than 2% of the total ESRD population in North America.[4] Black children have a two to three times higher ESRD incidence than white children.[5] Similarly, Australian and New Zealand Maoris have disproportionately higher ESRD rates.[6] Italy reports a mean CKD incidence of 12 cases per year per million in children under 20.[7] The Jordan University Hospital reports severe CKD incidence and prevalence at 10.7 and 51 per million age-related population (MARP), respectively.[8] An Iranian study found 11% of pediatric nephrology admissions were due to severe CKD, with half progressing to ESRD.[9] An Iraqi study reported 50 patients with CRF below 17 years, with a male-to-female ratio of 1.38:1 and 40% above 10 years old.[10] The primary causes of CKD in children vary by age. Congenital anomalies of the kidney and urinary tract (CAKUT) predominate in younger children, while acquired diseases like lupus nephritis and inherited diseases like Alport syndrome are more common in older children.[11] CKD's clinical presentation varies based on etiology and stage. CAKUT and genetic renal diseases often present with growth failure, vomiting, and polyuria. Glomerular CKD forms typically show edema, hypertension, hematuria, and proteinuria.[13] As CKD progresses, uremic symptoms like fatigue, nausea, and anorexia become prevalent,

along with edema and hypertension.[14] Laboratory tests show elevated blood urea nitrogen and serum creatinine, hyperkalemia, hyponatremia or hypernatremia, acidosis, hypocalcemia, hyperphosphatemia, and elevated uric acid. Proteinuria can lead to hypoalbuminemia. Renal function is measured or estimated by GFR.[15] The Kidney Disease Outcomes Quality Initiative (KDOQI) classifies CKD into five stages based on GFR, with stage 5 CKD indicating a GFR of less than 15 mL/min/1.73 m², necessitating renal replacement therapy (RRT).[16] CKD often causes growth failure, with the risk highest if CKD begins in early childhood.[17] Factors contributing to growth failure include disturbances in growth hormone metabolism, nutritional deficiencies, metabolic acidosis, uremia, anemia, and inflammation.[18] Anemia is a common CKD comorbidity, primarily due to decreased erythropoietin production by the diseased kidney. Other contributing factors include iron deficiency, nutritional deficiencies, inflammation, and chronic blood loss.[19] Hypertension is prevalent from the early stages of CKD, increasing as GFR declines. Cardiovascular complications, including left ventricular hypertrophy, are significant causes of morbidity and mortality in CKD patients.[20] Obesity is associated with CKD development and progression due to complex metabolic abnormalities, including inflammation, oxidative stress, and renal structural changes.[21] Calcium supplements manage high phosphate levels and prevent weakened bones.[22] GH therapy is recommended for persistent growth failure in CKD stages 3-5, with regular monitoring.[23] Treatment guidelines for dyslipidemia and anemia in CKD patients involve dietary management, statins, erythropoietin therapy, and iron supplementation.[24] RRT includes dialysis (hemodialysis and peritoneal dialysis) and transplantation, with the choice influenced by patient-specific factors and caregiver preferences.[25] Dietary management focuses on adequate protein intake, sodium and fluid restriction, and individualized potassium intake. Plant-based diets may delay CKD progression.[26] The aim of the study: determine the etiology, clinical presentation, and treatment modalities of CKD in children admitted to hospital.

METHOD

A retrospective study between August 1, 2023, and December 1, 2023, all paediatric patients diagnosed with chronic kidney disease (CKD) who were either admitted to Bint Al-Huda Teaching Hospital or attended private clinics in Thi-Qar Governorate, Iraq, underwent a retrospective investigation. The ethics committee of the hospital answered approval. The study tracked body weight, gender, and age among other factors. Following an exhaustive review of the patient's medical history, physical examination, and diagnostic procedures, the CKD diagnosis was determined. Children ranging in age from three months to fifteen years with a confirmed diagnosis of chronic kidney disease (CKD) are included under inclusion criteria. A glomerular filtration rate (GFR) of less than 90 mL/min/1.73m² for at least three months, with either or without evidence of kidney damage defines chronic kidney disease (CKD). Structural or functional problems in the kidney, like changes in blood or urine composition, anomalies found in imaging studies, or abnormalities discovered in a kidney biopsy[27] help one to detect kidney disease. Patients with acute renal injury or those who decline permission are excluded.

Data Collection

Designed specifically, a questionnaire gathered information on:

- Age and gender.
- Primary diagnosis—causes of chronic renal failure
- Clinical appearance.
- Level of serum urea and creatinine at recording time.
- Height and weight.
- Follow-up length of time.
- Intervention.

Methods and Laboratory Procedures

From every patient, venous blood samples were gathered in EDTA tubes and forwarded to the laboratory to be measured for serum creatinine and blood urea nitrogen, which would help to estimate GFR using the Schwartz formula.[28] Parents gave verbal permission; the ethical committee of Bint Al-Huda Teaching Hospital accepted the project. SPSS programme version 21 was used for statistical analysis.

RESULTS

This research has 57 individuals with CRF overall, distributed according on gender. Men are afflicted (1.19) times more than women, according our results. as table (1) shows.

Table 1: Distribution of CRF children by gender.

Sex	No. Of Patients (%)
Male	31 (54.4)
Female	26 (45.6)
Total	57 (100)

Their age and gender distribution let us divide our patients into four categories. One (1.7%) patient in the age category "< 1yr," was male. Patients ranging in age from 1 to 5 years comprised five (8.8%) girls and thirteen (22.7%) men. Patients in the age range of (5–10 years) had 11 (19.2%) male and 12 (21.1%) female count. Table (2) shows that patients aged more than ten years, six (10.6%) were men and nine (15.7%) were women.

Table 2: Distribution of patients with CRF according to their age and gender.

		Male No.(%)	Female No.(%)	Total No.(%)
Age	<1 year	1 (1.7)	0 (0)	1 (1.7)
	1 year - 5 years	13 (22.7)	5 (8.8)	18 (31.5)
	5 years - 10 years	11 (19.2)	12 (21.1)	23 (40.3)
	10-15 years	6 (10.6)	9 (15.7)	15 (26.3)
Total		31 (54)	26 (46)	57 (100)

Glomerular filtration rate (GFR) level dictates patient classification into five phases. From stage I till end stage renal disease (ESRD). More than two thirds of cases (70.2%) are individuals with stage III or IV renal insufficiency, according to findings. Following stage II 8 (14%) patients, the end stage group consisted in 7 (12.3%) patients and only 2 (3.5%) patients were in stage I renal insufficiency, as indicated in table (3).

Table 3: Distribution of patients according to stages of CRF.

Stages	No.(%)
Stage I	2 (3.5)
Stage II	8 (14)
Stage III	20 (35.1)
Stage IV	20 (35.1)
Stage V (ESRD)	7 (12.3)
Total	57 (100)

Found in 26 (45.6%) individuals, congenital urinary system anomalies were the most likely cause of CRF in this investigation. Found in 12 (46.1%), renal hypoplasia is the most often occurring kind of congenital defect. The second prevalent aetiology of CRF was glomerular disorders; nephrotic syndrome with focal segmental glomerulosclerosis has greatest prevalence; it was detected in 11 (61.1%) individuals. The idiopathic reasons thus comprise 19.3% (11 patient). At last, Hemolytic uremic syndrome and hereditary disorders were rather rare and each detected in one (1.8%) patient. as seen in Table 4.

Table 4: Distribution of patients according to causes of CRF.

Causes	No.	(%)
I- congenital abnormalities	26	45.6
a. Neurogenic bladder	8	14
b. Renal hypoplasia	12	21
c. Reflux nephropathy	4	7
d. Obstructive uropathy	0	0
e. Multicystic dysplastic kidney	2	3.5
II- Hereditary conditions	1	1.8
a. cystinosis	0	0
b. Oxalosis	0	0
c. Nephrocalcinosis	0	0
d. Alport disease	0	0
e. joubert syndrome	1	1.8
III- Glomerulopathy	18	31.6
a. focal segmental glomerulosclerosis	11	19.2
b. membranoproliferative glomerulonephritis	5	8.7
c. Diffuse mesangial sclerosis	0	0
d. Poststreptococcal glomerulonephritis	0	0
e. Henoch-shonlein purpura	0	0
f. Lupus nephritis	2	3.5
IV- Hemolytic uremic syndrome	1	1.8
V- Idiopathic	11	19.3
Total	57	100

Congenital abnormalities was the main cause of CRF in the age group less than 10 years; we found in total 19 (45.2% of total number of patients less than 10 years); followed by the glomerular disease which was found in 12 (28.5% of total number of patients less than 10 years). Congenital abnormalities were 7 (46.6% of total number of patients more than 10 years) and glomerular disease was 6 (40% of total number of patients more than 10 years); hence, these two causes account for roughly 96% of causes of CKD in patients above 10 whereas they

constitute 73.7% in age groups less than 10. With 11 (19.2%), idiopathic is the third most prevalent cause. As indicated in table (5), the genetic illnesses and HUS as a cause of CRD were rather infrequent in our research (1.7% for each).

Table 5: Causes of chronic renal failure at different age groups.

		Age				Total No. (%)
		<1 year No. (%)	1 – 5 years No. (%)	5 - 10 years No. (%)	10-15 years No. (%)	
Causes	congenital abnormalities	0	9 (15.7)	10 (19.7)	7 (12.2)	26 (45.6)
	Hereditary conditions	0	0	1 (1.7)	0	1 (1.7)
	Glomerulopathy	0	4 (7)	8 (14)	6 (10.3)	18 (31.5)
	Hemolytic uremic syndrome	1 (1.7)	0	0	0	1 (1.7)
	Idiopathic	0	5 (8.7)	4 (6.9)	2 (3.4)	11 (19.2)
Total		1 (1.7)	18 (31.5)	23 (40.3)	15 (26.3)	57 (100)

In this study the anaemia was the most common clinical manifestation in patients with CRF; it was identified in 55 (96.4%) individuals, followed by failure to thrive in 25 (43.8%), acidotic breathing 19 (33.3%), and oedema in total 18 (31.5%). There is total 15 (26.3%) hypertension. Found in four (7%) individuals alone are polyuria and polydipsia. (Table 6).

Table 6: Distribution of clinical features in patients according to their ages.

		Age				Total No. (%)
		<1 year No. (%)	1 – 5 years No. (%)	5 - 10 years No. (%)	10-15 years No. (%)	
Clinical features	Anemia	1 (1.75)	17 (29.7)	22 (38.5)	15 (26.2)	55 (96.4)
	Hypertension	0	3 (5.2)	4 (6.8)	8 (13.9)	15 (26.3)
	Failure to thrive	1 (1.75)	11 (19.2)	8 (14)	5 (8.7)	25 (43.8)
	Polyuria & polydipsia	1 (1.75)	1 (1.75)	2 (3.5)	0	4 (7)
	Oedema	1 (1.5)	3 (5)	8 (13.8)	6 (10.3)	18 (31.5)
	Acidotic breathing	1 (1.73)	5 (8.6)	6 (10.3)	7 (11.9)	19(33.3)

In this research, just 2 patients (3.5%) had peritoneal dialysis; 49 patients (86%) still on conservative medical line of care and 6 patients (10.5%) had vascular access and put on hemodialysis programme. At last, in our research there was no kidney transplantation performed. Table 7 contains (table).

Table 7: Distribution of number of patients according to renal replacement therapy.

Mode of renal replacement therapy	No. of patients (%)
Conservative medical treatment	49 (86)
Peritoneal dialysis	2 (3.5)
Hemodialysis	6 (10.5)
Renal transplant	0 (0)
Total	57 (100)

DISCUSSION

In this study, chronic renal failure (CRF) was more prevalent in males (54.4%) than females. This finding aligns with Nariman et al.'s study in Iraq, where 58% of patients were male[29], and with Jameela's study in Saudi Arabia.[30] The higher prevalence in males may be due to their increased likelihood of congenital anomalies.[31]

Patient Classification by Age and CKD Stage

Upon classifying patients by age, 40.3% were in the 5-10 year age group, as shown in Table 2. This may be due to the clinical manifestations, such as failure to thrive, becoming more apparent in this age range. When classifying by CKD stage based on GFR, 35% of patients were in stage III, as shown in Table 3. This result is similar to Nariman et al.'s study, which found 32% of CKD patients in the moderate stage (GFR 30-60).[29] However, it differs from Sakhujav et al.'s study in India and Pakistan, which reported a higher percentage of CRF patients in ESRD.[31] The reduction in ESRD cases may be due to advancements in CKD management.

Etiology of CKD

Congenital abnormalities were the leading cause of CKD in this study, seen in 45.6% of patients, with renal hypoplasia being the predominant cause (21%). This is slightly higher than the 36% reported by Nariman et al.[29] Early detection and treatment can prevent or delay adverse outcomes of CKD. Antenatal ultrasonography screening for urinary tract anomalies can detect significant structural disorders treatable postnatally.[32]

Reflux nephropathy was present in 15.3% of patients, close to Nariman et al.'s 10%.[29]

Other Causes of CKD

Glomerulopathies were found in 31.6% of patients, similar to the 28% in Nariman et al.'s study[29], but higher than the 19% reported in Tunisian children[33], indicating improved diagnosis. Hereditary nephropathy was less significant in this study, with only one patient (1.7%), compared to 28% in Nariman et al.'s study and 29% in the Tunisian study. This may be due to limited diagnostic facilities and high costs in our locality.

Focal Segmental Glomerulosclerosis (FSGS)

FSGS was the second major cause of CKD, found in 19.2% of cases. This is higher than Nariman et al.'s 12%[29] and more than studies by Dr. Janan in Iraq[34] and Mark Mitsnefes in North America, where FSGS accounted for 9% and 7.7% of patients, respectively[35], reflecting improved diagnosis.

Anemia and Hypertension

Anemia was present in 96.4% of patients, significantly higher than Nariman et al.'s 32% and Pankaj et al.'s study in India.[36] Hypertension was found in 26.3% of patients, less than the 48% reported by Mark Mitsnefes in North America.[35] Short stature and failure to thrive were observed in 43.8% of patients, higher than Nariman et al.'s 24%, suggesting delayed diagnosis and poor treatment compliance.

Treatment

Treatment of CKD includes dialysis or transplantation if uremic symptoms are present. Only 3.5% of patients underwent intermittent peritoneal dialysis, and 10.5% were referred for hemodialysis. The higher hemodialysis percentage is due to limitations and contraindications of peritoneal dialysis. No patients underwent renal transplant. Compared to Nariman et al.'s study, where 42% were on peritoneal dialysis and 8% on hemodialysis, our study shows a decrease in interventional therapy, possibly due to fewer ESRD cases.

CONCLUSION

Congenital abnormalities of the urinary tract are the most prominent cause of CKD Renal hypoplasia it is the most common form of congenital abnormalities. Anemia was the most frequent clinical manifestation in patients with CKD. The most prevalent pediatric age group to be diagnosed with CKD is 5-10 years old. Conservative medical management is the most common type of renal replacement therapy. Most of the patient in this study appear with stage III & IV when the patient classified according to the GFR.

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