ORIGINAL RESEARCH PAPER
Volume - 10 | Issue - 03 | March - 2021 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY ON CLINICAL AND BIOCHEMICAL PROFILE OF CHRONIC KIDNEY DISEASE IN CHILDREN ATTENDING TERTIARY CARE HOSPITAL.

Paediatrics

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ABSTRACT

CKD is characterized by an irreversible deterioration of renal function that gradually progressed to end stage renal disease. Moreover, in the past two decades, the incidence of the chronic kidney disease in children has steadily increased. But early recognition and treatment of primary kidney problem and related complications can improve the growth, development and quality of life in children. **Methods:** This was a cross-sectional study done among a hundred children with a diagnosis of CKD, presented at Patna Medical College and Hospital as an outpatient/inpatient. **Results And Conclusion:** In this study, the mean age of children was 9.92±4.09 with 20% (20/100) children between 2-5 yrs, 70% (70/100) of children between 6-12 yrs and 10% (10/100) between 13-18 yrs. The majority of children were in school age groups. The incidenceand prevalence of CKD are greater in males than females (75% were males) Congenital renal anomalies were the main cause of CKD (50%). There was positive correlation between complications of CKD with falling GFR, with statistically significant correlation in anemia, hypocalcemia, secondary hyperphosphatemia and hyperparathyroidism. The risk for poor growth increased with decreasing renal function, although even children with mild renal impairment were at risk for poor growth. There was statistically significant difference in clinical presentation of glomerular and tubular disorder. HTN, proteinuria, hematuria, oliguria and edema were more significant in glomerular disorder and bony deformities were in tubular disorder.

KEYWORDS

Clinical features, Biochemical profile , CKD

INTRODUCTION

Childhood and adolescent CKD, a progressive disorder with multiple systemic morbidities, is associated with prolonged patient sufferings, increased treatment cost, and death, inspite of much caring effort. Especially in its advanced form, it poses serious cardiovascular, neurologic, metabolic, hematologica, endocrine and other varied clinical problems. The management burden of CKD has increased over the years across the globe and the situation is even worse in developing countries with limited resources.**1,2** The impact of CKD is significant. Unlike adults, children are in formative stages of development and are particularly vulnerable to the adverse effects of CKD. Early detection and aggressive management have the potential to improve outcomes in young patients with CKD. Very few studies are done in children and very little is known about the natural history of early stages of CKD in this population.**3** Most epidemiological information on chronic kidney disease (CKD) originates from data available on end-stage renal disease (ESRD). Little information is available on the prevalence of earlier stages of CKD, as patients are often asymptomatic. The epidemiological studies that have been performed provide evidence that ESRD represents the "tip of the iceberg" and suggest that patients with earlier stages of disease are likely to exceed those reaching ESRD by as much as 50 times.**4**

CKD burden became a source of concern both to the International Society of Nephrology and International Federation of Kidney Foundation that it was considered imperative to jointly launch a 'World Kidney Day' that has been held yearly since 2006.**5** NKF-K/DOQI (National Kidney Foundation-Kidney Disease Outcome Quality Initiative) has formulated comprehensive CKD clinical practice guidelines to promote early disease detection, delay disease progression, prevent related complications and improve outcome.**6**

An understanding of the important clinical manifestations in various stages of CKD and its important causes is important, as it may guide the distribution of limited resources towards its prevention. Thereafter, monitoring and management depends on the stage of CKD irrespective of the cause. Thus a sound knowledge of the children likely to develop ESRD helps to utilise the resources as optimally possible.

AIMS AND OBJECTIVES:

To study the clinical and biochemical profile of chronic kidney disease in children.

MATERIALS AND METHODS

It was a descriptive, cross-sectional study. 100 children were included in the study. All children aged between 2-18 years diagnosed to have CKD (defined by KDOQI), recruited from the outpatient CKD clinic and paediatric nephrology ward in Patna Medical College Hospital. From August 2012 to July 2013.

INCLUSION CRITERIA

- All children diagnosed to have CKD stage 2-stage 4 (defined by KDOQI criteria) presenting to CKD clinic and in patient department.
- Age group: 2-18 yrs.
- Consenting to participate in the study.

EXCLUSION CRITERIA

- Post-transplant children.
- Sick children requiring ICU care.

Methods of Data Collection

Children diagnosed to have CKD (KDOQI Criteria), who came to CKD clinic or admitted in the inpatient department were evaluated as per proforma (Appendix 1), after taking consent from parents.

STATISTICAL METHODS

Analysis was done using the Statistical software Stata/IC-12.1 and $p<0.05$ is considered as significant.

RESULTS:

The mean age of children was 9.92±4.09 (yrs). CKD is more prevalent school age group compare to preschool group. Males are more affected than females (male:female ratio 2.3:1).70% children had tubulointerstitial disorder and 30% had glomerular disorder. Congenital malformation - obstructive uropathies, reflux nephropathies, renal aplasia/hypoplasia/dysplasia were the main etiologies of CKD. The etiologies in older children were mainly reflux and obstructive uropathies, which are preventable causes of CKD. 53.22% in stage 4 and 45% in stage 5 were new cases-indicating this children missed early medical attention. Complications of CKD were: mineral bone disease, HTN, anemia, hypoalbuminemia, proteinuria, metabolic acidosis, hyperkalemia and growth failureThere was statistically significant difference in clinical presentation of glomerular and tubular disorders. HTN, proteinuria, hematuria, oliguria and edema were more significant in glomerular disorders and bony deformities were in tubular disorders.

Table 1: Clinical features

Clinical Features	Number (Percentage)
Edema	
present	30
absent	70
Puffiness	

present	40
absent	60
Oliguria	
present	30
absent	70
Hematuria	
present	10
absent	90

Table 2: Biochemical features-1

Lab parameters(units)	Mean ± S.D
Na (mEq/L)	135.85±3.45
K (mEq/L)	4.58±0.79
Cl (mEq/L)	102.29±4.96
HCO3 (mEq/L)	18.35±4.66
Calcium (mg/dl)	8.25±1.30
Phosphate (mg/dl)	5.33±1.60
S. Cholesterol (mg/dl)	177.24±77.83
Total protein (g/dl)	6.84±1.08
Albumin (g/dl)	3.30±0.78

Table 3: Biochemical features-2

Lab parameters (units)	Median (Range)
Bu (mg/dl)	79.50 (11.00 – 431.00)
Cr (mg/dl)	2.80 (0.80 – 16.70)
GFR(ml/min/1.73 m2)	21.45 (1.18 – 86.60)
PTH (pg/ml)	156.00 (7.20 – 2547.00)
Vit. D (ng/ml)	4.00 (0.00 – 13.00)

Table 4: Biochemical features-2

Lab parameters	Number (Percentage)
Urine protein	
present	78 (78.00)
Absent	22 (22.00)
Urine WBC	
Present	24 (24.00)
Absent	76 (76.00)
Urine RBC	
Present	15 (15.00)
Absent	85 (85.00)

DISCUSSION

The present study consists of 100cases of children diagnosed to have CKD aged between 2-18 yrs. In the North American Pediatric Renal Trials and Collaborative Studies(NAPRTCS)database, which includes patients below 21 years of age with a CrCl less than 70 mls/min/1.73m², found that CKD is common in school age group than pre-school group.**10** In this study, the mean age of children was 9.92±4.09, with 10% children between 2-5 yrs, 70% of children between 6-12 yrs and 20% between 13-18 yr, the majority of children were in school age groups. The incidence and prevalence of CKD are greater in males than females. Two thirds of patients were males in both the Italian registry (ItalKid project) and the chronic renal insufficiency (CRI) registry of the North American Pediatric Renal Trials and Collaborative Studies (NAPRTCS).**10** In most other studies also males were predominant (Warady and Chadha,2007).**9** The increased risk of CKD in males is due to the higher incidence of congenital anomalies of the kidney and urinary tract (CAKUT), including obstructive uropathy, renal dysplasia, renal hypoplasia, and prune belly syndrome.**9,10**

In this study, in all age groups, males were predominant (70%). The increased risk of CKD in males is due to the higher incidence of congenital anomalies of the kidney and urinary tract (CAKUT). Whether parents' attention to male child is the reason of this difference, and should be assessed precisely. The children were classified in to different stages based on GFR (KDOQI Classification) stage2 were 18% stage3 were 20% stage 4 were 37% and stage 5 were 34%. The median GFR was 21.5 (1.18 – 86.6) ml/min/1.73 m2, median blood urea 79.5 (11.0-431.0) mg/dl creatinine 2.8 (0.8-16.7) mg/dl. Renal replacement therapies are prohibitively expensive and hardly accessible in countries with limited resources. Most patients cannot afford the financial burden of the disease and withdraw treatments. In India, treatment withdrawal was the cause of death in 70% of ESRD patients. 25% of children were on RRT, majority of them were on HD (73.33%) and remaining on CAPD222% and 6.6% had direct transplant .six of the children who were on dialysis underwent renal transplant. In stage 4, CKD 7/30 (22.11%) and in stage 5 CKD 25/35(72.77%) were on RRT. 27% (8/33) of children in Stage 7S were on conservative management, mainly due to financial reasons. In developing country like India there is no screening guidelines to detect CKD so there is a chance that early stages of CKD which is asymptomatic can be easily missed. This is substantiated from a study from India of adult patients with a vesico-ureteric reflux where 85% patients had CRF at presentation, including 35% with ESRD. A reflux was diagnosed during routine pre-transplant evaluation in 6.5% of all adult ESRD patients.**10**

In this study, 56% children were on regular follow up in our hospital and 48% were recently diagnosed as CKD in our hospital or referred from outside. In that, 44.44% children in stage 4 and 55% children in stage 5 were diagnosed recently. It indicates that these children missed early medical attention. Studies shown that proteinuria is a strongly-associated biomarker of CKD and is a possible sign of underlying glomerular disease or tubular dysfunction. Persistent (≥3 months) increased excretion of urinary protein in a non-orthostatic pattern is indicative of CKD.**17** In this study, proteinuria and hypoalbuminemia were significantly more prevalent in glomerular disorder (p values 0.011and 0.004) Hyperlipidemia significantly associated nwith glomerular disorder (p value 0.048

CONCLUSION

Study concludes that CKD is more prevalent in school age groups compare to preschool groups. Males are more predominant than females. CAKUT is the main etiologies of CKD in all age groups. Early detection of initial stages of CKD is the most important factor to prevent the progression of CKD. Complications of CKD are present in early stages which worsen in later stages. Normocytic normochromic anemia is common in CKD with worsening of anemia as GFR falls. The cause of growth failure in CKD is multifactorial. The risk for poor growth increased with decreasing renal function, although even children with mild renal impairment were at risk for poor growth.

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