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STUDY ON CLINICAL AND BIOCHEMICAL PROFILE OF CHRONIC KIDNEY DISEASE IN CHILDREN VISITING ACS MEDICAL COLLEGE AND HOSPITAL,CHENNAI.

Pediatrics

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ABSTRACT

Chronic kidney disease 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. This was a cross-sectional study done among a hundred children with a diagnosis of CKD, presented at ACS Medical College and Hospital as an outpatient/inpatient. In this study, the mean age of children was 8.54±3.21 with 20% (20/100) children between 3-6 yrs, 70% (70/100) of children between 7-13 yrs and 10% (10/100) between 14-18 yrs. The majority of children were in school age groups. The incidence and prevalence of chronic kidney disease are greater in males than females (70% were males) Congenital renal anomalies were the main cause of chronic kidney disease (40%). There was positive correlation between complications of chronic kidney disease with reducing Glomerular Filtration Rate, with statistically significant correlation in anemia, hypocalcaemia, hyperphosphatemia and hyperparathyroidism.

KEYWORDS

Chronic kidney disease, children, biochemical parameter, Anaemia

INTRODUCTION:

Chronic kidney disease (CKD) is a major health problem worldwide with increasing incidence and prevalence that is threatening to bring on the onset of a real 'epidemic'. Independent of the initial cause, CKD is a clinical syndrome characterized by a gradual loss of kidney function over time. In particular, the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines have defined CKD as abnormalities of kidney structure or function, present for more than 3 months, with implications to health. This definition has been formulated for the adult population, where CKD is a common and well-known health problem, but the KDIGO guidelines for definition and staging are not fully applicable to the paediatric population. Indeed, paediatric CKD, while sharing the basic physiopathologic mechanisms with the same disease in the adult population, could be in some ways considered a stand-alone nosologic entity. Childhood CKD presents clinical features that are specific and totally peculiar to the paediatric age, such as the impact of the disease on growth. 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. 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 chronic kidney disease in this population. 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 chronic kidney disease, 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. chronic kidney disease 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.

National Kidney Foundation-Kidney Disease Outcome Quality Initiative has formulated comprehensive chronic kidney disease clinical practice guidelines to promote early disease detection, delay disease progression, prevent related complications and improve outcome. An understanding of the important clinical manifestations in various stages of chronic kidney disease 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 chronic kidney disease irrespective of the cause. Thus a sound knowledge of the children likely to develop ESRD helps to utilize the resources as optimally possible.

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 ward in ACS Medical College and Hospital From june 2019 to July 2020.

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 after taking consent from parents.

STATISTICAL METHODS

Analysis was done using the Statistical software and $p<0.05$ is considered as significant.

RESULTS:

The mean age of children was 8.84±3.07 (yrs). Chronic kidney disease is more prevalent school age group compare to preschool group. Males are more affected than females (male:female ratio 2.3:1).75% children had tubule interstitial disorder and 25% had glomerular disorder. Congenital malformation - obstructive uropathies, reflux nephropathies, renal aplasia/hypoplasia/dysplasia were the main etiologies of Chronic kidney disease. The etiologies in older children were mainly reflux and obstructive uropathies, which are preventable causes of Chronic kidney disease. 51.23% in stage 4 and 42% 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	Numbers (%)
Edema	
present	28
absent	72

Puffiness	
present	36
absent	64
Oliguria	
Present	35
absent	65
Hematuria	
Present	15
absent	85

Table.2 Biochemical parameters

Lab parameters(units)	Mean ± S.D
Na (mEq/L)	142.14±2.25
K (mEq/L)	5.45±1.12
Cl (mEq/L)	112.34±3.67
HCO3 (mEq/L)	19.24±3.62
Calcium (mg/dl)	9.21±1.10
Phosphate (mg/dl)	7.63±1.40
S. Cholesterol (mg/dl)	183.21±67.76
Total protein (g/dl)	8.65±1.18
Albumin (g/dl)	4.20±0.68

Table. 3 Biochemical parameters (urine analysis)

Lab parameters	Number (Percentage)
Urine protein	
present	70 (70.00)
Absent	30 (30.00)
Urine WBC	
Present	25 (25.00)
Absent	75 (75.00)
Urine RBC	
Present	18 (18.00)
Absent	82 (82.00)

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. 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 In most other studies also males were predominant (Warady and Chadha,2007). 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.

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 classifed in to different stages based on GFR (KDOQI Classifcation) stage2 were 16% stage3 were 22% stage 4 were 34% and stage 5 were 36%. 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.

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. 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. In this study, proteinuria and hypoalbuminemia were significantly more prevalent in glomerular disorder (p values 0.011and 0.004) Hyperlipidemia significantly associated with glomerular disorder.

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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