

**Original article:**

## Study of assessment of the profile of children from 0 to 5 years with renal diseases

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### Abstract:

**Introduction:** The development of the human kidney starts in the first trimester.<sup>[3]</sup> The embryological development of the kidney is a complex process occurring between the sixth to eighth weeks of life, while the ascent of the kidney occurs during the ninth week

**Methodology:** Present study work was conducted at Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune. It was cross sectional study. Based on hospital records, subjects with renal diseases below five years of age were found to be on an average 10 cases per month. Considering this as baseline data and an acceptable error of 10%, sample size is 132 by WINPEPI Software. It is rounded off to 140.

**Results :** Maximum cases, 62 (44.3%) were contributed by AKI, where 31 (22.1%) were in the 13-30 months age group, followed by 19 cases (13.6%) <1 month and 12 cases (8.6%) in the 1-12 months age group. 38(27.1%) cases of CAKUT were seen, with a similar pattern of age wise distribution as that of AKI. UTI contributed to 33 cases (23.6%) followed by 31 cases (22.1%) of nephrotic syndrome.

**Conclusion:** From this we may conclude that, significant number of children are diagnosed with renal and urinary tract diseases with delayed ages of presentation, which could be prevented or treated if timely diagnosed.

**Keywords:** Renal disease, first trimester

### Introduction:

The development of the human kidney starts in the first trimester.<sup>[1-3]</sup> The embryological development of the kidney is a complex process occurring between the sixth to eighth weeks of life, while the ascent of the kidney occurs during the ninth week.<sup>[4]</sup> Initially, the kidney is located at the level of the sacral spine, it will then ascend while rotating along its axis to the level of the upper lumbar vertebrae. <sup>[5]</sup> Fetal urine becomes a major contributor to amniotic fluid at about 20 weeks, with production of 300 mL/kg fetal weight/day. <sup>[6,7]</sup> Paediatric renal disorders form an important category of disorders in terms of mortality and morbidity and are a large portion of the expenses incurred on both family and health services. <sup>[8]</sup> Significant improvement in disease progression and outcome is being reported from developed countries. This is mostly as a result of screening programmes, management facilities, health insurance schemes and readily available expertise.<sup>[9]</sup> Due to its compensatory capacity, early signs of disease involving the organ are often not detected, and a considerable amount of renal damage may occur before signs and symptoms are identified. Renal disorders in children and young adults differ in course, as compared to adults and respond varying to different treatment regimes.<sup>[10]</sup>

**Methodology:**

Present study work was conducted at Dr. D. Y. Patil Medical College, Hospital and Research Centre, Pimpri, Pune. It was cross sectional study. Based on hospital records, subjects with renal diseases below five years of age were found to be on an average 10 cases per month. Considering this as baseline data and an acceptable error of 10%, sample size is 132 by WINPEPI Software. It is rounded off to 140.

**INCLUSION CRITERIA:**

1. Children from 0 to 5 years of age
2. Children with renal diseases (diagnosed or incidental)
3. Parents willing to give informed written consent

**EXCLUSION CRITERIA:**

1. Patients more than 5 years of age.
2. Parents not willing to give consent for the study.

Institutional Ethical Committee clearance was obtained before the start of the study.

Informed written consent of all the patients from the parents/guardians were taken before the start of the study.

All patients from the OPD, wards and ICUs, fitting the inclusion criteria were enrolled for the study.

Detailed clinical history and examination was done. Relevant data regarding all investigations was collected for children included in the study.

**Results:**

Out of 140 cases, 83 (59.3%) were male and 57 (40.7%) were female. 87 cases (62.1%) were in the 13-60 months age group, 27 cases (19.3%) were in the age group of <1 month and 26 cases (18.6%) were in the age group of 1 month-12 months.

Maximum cases, 62 (44.3%) were contributed by AKI, where 31 (22.1%) were in the 13-30 months age group, followed by 19 cases (13.6%) <1 month and 12 cases (8.6%) in the 1-12 months age group. 38(27.1%) cases of CAKUT were seen, with a similar pattern of age wise distribution as that of AKI. UTI contributed to 33 cases (23.6%) followed by 31 cases (22.1%) of nephrotic syndrome.

Males (59.3%) are overall more affected than females (40.7%) and in every renal disease. The cases were marginally more in females (11.4%) in nephrotic syndrome than in males (10.7%).

**Table-1 Distribution of congenital anomalies of the renal system.**

Type of congenital renal anomaly	Oligohydramnios (%)	Renal disease diagnosed (%)	No renal abnormality detected (%)	Total (%)
VUR	0(0)	3 (2.1)	1(0.7)	4(2.8)
PUV	1(0.7)	2(1.4)	1(0.7)	4(2.8)
PUJ obstruction	0(0)	3(2.1)	3(2.1)	6 (4.2)
Antenatal hydronephrosis	0(0)	10 (7.1)	0(0)	10(7.1)
Neurogenic bladder	0(0)	0(0)	1(0.7)	1(0.7)
Multicystic dysplastic kidney	5(3.6)	2(1.4)	1(0.7)	8(5.7)
Ectopic kidney	1(0.7)	6(4.3)	1(0.7)	8(5.7)
Extra-renal pelvis	0(0)	2(1.4)	0(0)	2(1.4)
Complete duplex	0(0)	1(0.7)	0(0)	1(0.7)
Incomplete duplex	0(0)	1(0.7)	0(0)	1(0.7)
Unilateral Renal Agenesis	0(0)	3 (2.1)	2(1.4)	5(3.6)
Horseshoe kidney	0(0)	3 (2.1)	0(0)	3 (2.1)
Solitary Pelvic Kidney	0(0)	3 (2.1)	0(0)	3 (2.1)
Malrotation	0(0)	0(0)	1(0.7)	1(0.7)

n=140

Many of the congenital diseases of the renal system were overlapping.

38 cases (27.1%) out of 140 were congenital anomalies of the renal system. 27.8% were diagnosed antenatally, 5% were not detected and 12.3% were diagnosed with oligohydramnios prior to birth.

Many of the congenital diseases of the renal system were overlapping.

Amongst congenital anomalies of the renal system, 33 were vaginal deliveries (57.9%) and 24 were Caesarean sections (42.1%).

Many of the congenital diseases of the renal system were overlapping.

Amongst congenital anomalies of the renal system, term babies were 45(78.9%) and preterms were 12 (21.1%)

**Table-2. Symptomwise distribution of cases**

Symptoms	No. of cases	Percentage(%)
Fever	39	27.9
Painful/burning micturition	13	9.3
Blood in urine	7	5.0
Frothy Urine	12	8.6
Decreased urine output	55	39.3
Increased passage of urine	10	7.1
Abnormal urinary stream	2	1.4
Periorbital swelling	34	24.3
Generalized swelling	34	24.3
Pain abdomen	18	12.9
Abdominal distension	12	8.6
Vomiting	24	17.1
Loose stools	7	5.0
Failure to gain weight	4	2.9

n=140

Table 3 shows the symptomwise distribution of 140 cases. The most common symptom was decreased urine output (39%), followed by fever (27.9%), periorbital swelling and generalized swelling equally (24.3%), vomiting (17.1%).

**Table-3 Distribution of cases according to blood pressure readings in various age groups.**

Age groups	Blood pressure stage				Total
	Normal	Increased BP	Stage 1 Hypertension	Stage 2 Hypertension	
<1 month	9	12	5	1	27
1-12 months	13	2	4	7	26
13-60 months	25	10	24	28	87
Total	47	24	33	36	140
Chi square p value=<0.001 (Significant)					

n=140

47 cases (33.6%) were normotensive, followed by 36 cases of Stage 2 Hypertension (25.7%), 33 cases of Stage 1 Hypertension (23.6%) and 17 cases of increased blood pressure or pre-hypertension (17%).

In <1 month of age group, maximum cases (8.6%) had pre-hypertension, while 13 cases (9.3%) had normal blood pressure in the 1-12 month age group. 28 cases (20%) were stage 2 HTN in the 13-60 months age group. Anasarca was present in 44 cases (31.4%), most of which were nephrotic syndrome. Amongst cases of nephrotic syndrome, 2 cases had pedal edema (1.4%), 31 cases had periorbital edema (22.1%), 10 cases had scrotal/vulvar edema (7.1%) and 11 cases had ascites (7.8%).

### **Discussion:**

Diagnosis of renal diseases in infants and children may be challenging as they may present with few symptoms, have different etiologies as compared to adults and respond variously to treatment protocols. A crucial question for nephrology in developing countries is how to define strategies that allow early identification of children at risk of developing a renal condition later on in life<sup>[10]</sup>. Children with potential treatable diseases e.g. urological, are often referred late with advanced disease. Due to the lack of advanced diagnostic and treatment facilities in many of rural areas, incomplete diagnosis and suboptimal treatment also add to the problem. Eventually, all of these factors lead to progression or renal disorders to end stage renal failure (ESRF) leading to high morbidity and mortality<sup>[11]</sup>.

Hence this study was conducted, to attempt early diagnosis, successful management of common childhood renal diseases and reducing their morbidity and mortality. Renal diseases were found to be more common in males in 83 cases (59.3%) than females in 57 cases (40.7%), with a male to female ratio of 1.4:1. In this study, the most commonly affected age group constituted of 87 patients (62.1%) were children between 13 months-60 months followed by 27 patients (19.3%) less than 1 month of age and 26 patients (18.6%) from 1 month-12 months of age..

In this study, out of 140 cases, the main renal diseases were: acute kidney injury (AKI) in 62 (44.3%), congenital renal anomalies in 38 (27.1%), urinary tract infection in 33 (23.6%), nephrotic syndrome in 31 (22.1%), hydronephrosis in 20 (14.2%), chronic kidney disease in 10 (7.1%), acute glomerulonephritis in 5 (3.5%), calculi in 4 (2.9%), pyelonephritis in 2 (1.4%), pyonephrosis in 2 (1.4%), Wilm's tumour in 1 (0.7%) and 1 simple cyst (0.7%).

Acute kidney injury occurred in 62 patients (44.3%), out of which, 33(53.2%) were due to pre-renal causes, 21(33.9%) were due to intrinsic renal causes and 8(12.9%) were due to post-renal causes. Overall, the main cause of AKI was due to septic shock, encompassing 23 patients (37.1%) followed by drug induced nephrotoxicity in 18(29%), most of which were due to Vancomycin. Hypovolemia, due to severe dehydration, contributed to 9(14.5%) cases of AKI while hemolytic uremic syndrome and multicystic dysplastic kidney constituted 3(4.8%) each and cardiogenic shock and nephrolithiasis had 1(1.6%) each. In a study done by Orta-Siba et al in Venezuela, AKI was seen in 99 patients (2.8%), almost half of which (43%) was secondary to acute dehydration, 15% to birth asphyxia, 14% to septicemia, and 23% to multiple factors, dehydration and nephrotoxicity being the most frequent causes in this group<sup>[12]</sup>. In Iran, in a study conducted by Ali D et al, AKI accounted for 99(7.3%) cases and the main cause was severe dehydration<sup>[13]</sup>.

In this study, congenital anomalies of the kidney and urinary tract (CAKUT) were detected in 38(27.1%) patients. A study from Jordan done by Radi MA et al, where congenital diseases of the renal system were found to be the most common renal disease in 170 (28.4%) and the majority of children were found to have

vesicoureteric reflux (VUR)<sup>[58]</sup>. In this study, VUR was detected in 4(10.5%) patients of CAKUT. In the United States, 20,000 babies are born with kidney abnormalities each year..Out of 38 patients, the most common congenital anomaly detected in this study was antenatal hydronephrosis 10(26.3%), multicystic dysplastic kidney and ectopic kidney 8(21.1%), 6 cases of PUJ obstruction (15.8%), 4 VUR(10.5%) and PUV (10.5%), 3 horseshoe kidney and solitary pelvic kidney (7.9%). Only 1(2.6%) neurogenic bladder, complete and incomplete duplex kidney and malrotation was seen.

### Conclusion:

From this we may conclude that, significant number of children are diagnosed with renal and urinary tract diseases with delayed ages of presentation, which could be prevented or treated if timely diagnosed.

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