

Acquired Cystic Kidney Disease in ESRD Patients On Maintenance Hemodialysis at A Tertiary Care Dialysis Center.

**Syed Rizwan Ali Bokhari ^{1*}, Maria Rizwan Bokhari ², Maha N. Syed ³, Hafiz Ijaz Ahmad ¹,
Syed Arsalan Khalid ¹, Zaman Khan Aseer ¹, Ayesha Mehmood Malik¹, Faisal Akhtar ⁴**

**¹Department of Medicine,
Division of Nephrology,**

**² Department of Radiology,
Allama Iqbal Medical College,
Jinnah Hospital Lahore.
Lahore, Pakistan**

³ Department of Medicine, CMH Lahore Medical College, Lahore, Pakistan.

⁴ Department of Cardiology, Ochsner Health system, New Orleans, USA.

*** Department of Nephrology and Hypertension,
Tulane University,
New Orleans, USA.**

Abstract:

Background:

Renal cysts are commonly observed in patients on maintenance hemodialysis (HD). Most of these patients are asymptomatic, while some report hematuria and lumbar pain. Its association with renal cell carcinoma is also well known. The frequency of acquired cystic kidney disease (ACKD) is not known in our End-stage renal disease (ESRD) population. We studied the prevalence of ACKD and its correlation with patient's characteristics in our dialysis population.

Methods:

Seventy-Four ESRD patients on maintenance hemodialysis at Jinnah Hospital Dialysis center were assessed for the study. Three patients with Autosomal dominant polycystic kidney disease (ADPKD) were excluded. None of the other 71 patients had previously known the history of renal cysts. These patients underwent ultrasound examination by consultant radiologist for the presence of renal cysts.

Results:

The median age of patients was 50 years (range 17-82), and 44 (64%) were male. Median duration on hemodialysis was four years (1-12 years). Cause of ESRD was Hypertension (63%) Diabetes mellitus (30%) and Obstructive uropathy (7%). Twenty-nine (40%) patients had hepatitis C infection. Sixty (85 %) patients were on thrice weekly, and 11 (15%) were on twice-weekly HD. Thirty-three (46%) patients had one renal cyst, 26 (37%) patients had 2-5 renal cysts, and 12 (17%) patients had more than five renal cysts bilaterally. Thirty-five (49%) Patients getting HD for less than three years had a median of three cysts (range 0-15), while remaining patients on HD for more than three years had a median number of 4.5 cysts (range 0-26). Nine (13%) on HD for less than one year had multiple renal cysts (1-4). No significant correlation was found between ACKD and duration of dialysis, the frequency of dialysis, age, gender,

comorbidities, and Hepatitis C status. None of these patients had evidence of extrarenal cysts, retroperitoneal or intrarenal hemorrhage.

Conclusion:

No significant correlation between ACKD and duration of hemodialysis was observed while a high frequency of renal cysts was seen earlier (within one year of HD). The reason may be the late initiation of HD at a much lower GFR, which is a routine in the developing countries.

Keywords: Acquired cystic kidney disease, ESRD patients, Hemodialysis

Corresponding Author:

Dr. Syed Rizwan Bokhari

Consultant Nephrologist

USA

Email: riz.bokhari@gmail.com

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Introduction:

Acquired cystic kidney disease (ACKD) is a condition where patients with end-stage renal disease (ESRD), present with multiple bilateral cysts of small to medium size. These cysts are usually <0.5 cm in diameter but can be as large as 2–3 cm [1].

Patients with polycystic kidney disease should be differentiated from those with ACKD. In ACKD, there is no family history of cystic disease and cysts do not develop in other organs and is usually seen as frequent finding in patients on long-term hemodialysis. On the contrary, people with the autosomal dominant polycystic kidney disease often have a family history, and the cysts may occur in the other organs [2]. Kidneys appear small to normal in size in AKCD, as opposed to the extremely large kidneys found in all ADPKD individuals with renal insufficiency. Patients are usually asymptomatic however some may experience lumbar pain, urinary tract infections, and hematuria.

In adult patients, there is substantial evidence that the risk for ACKD significantly increases with longer duration of chronic dialysis. One of the studies highlighted that the prevalence of the ACKD in the ESRD population was variable and depended on the duration of dialysis [3]. It is also known that renal cysts are present before HD treatment in approximately one-third of all patients. The prevalence of ACKD described in HD patients lies between 35% to 79% [4]. It was initially believed that ACKD occurs in HD patients exclusively; however, ACKD was later found equally often in association with peritoneal dialysis treatment. Although the close connection between ACKD and dialysis treatment is indisputable, available data confirm that the uremic conditions promote the development of ACKD. Considering a supportive treatment modality, dialysis helps prolong the patient's survival, thus giving ACKD time to develop. Studies have described the existence of ACKD before HD or early in the stages of chronic

kidney disease [5]. Patients with ACKD have a 50 times higher risk of developing RCC compared to the general population [6,7].

We decided to carry out a study to find out the incidence of ACKD in our ESRD population on hemodialysis, since no data exists highlighting the ACKD in dialysis population in Pakistan.

Methods

This cross-sectional study was performed on 74 adult patients with ESRD (End-stage renal disease) on Hemodialysis in Jinnah Hospital, Dialysis Center Lahore, Pakistan from April to

Cause of ESRD	No. of patients (%)
Diabetes	45 (63)
Hypertension	21(30)
Obstructive uropathy	5 (7)
Hepatitis C	29 (40)

June 2016. Three patients with autosomal dominant polycystic kidney disease (ADPKD) were excluded. None of the remaining 71 patients had a previously known history of renal cysts. The study included 44 men and 27 women with a

median age of 50 years (range 17-82). The patients took part in the study voluntarily and were asked for consent before any procedures. The following information was collected: Age, gender, the cause of ESRD, duration of hemodialysis, the frequency of hemodialysis and history of a kidney transplant. The causes of ESRD in the patients included: Hypertension (63%), Diabetes mellitus (30%), Obstructive uropathy (7%) and Hepatitis C infection (40%). An Ultrasound was performed on each patient by the same consultant radiologist using an Ultrasound machine (Toshiba Aplio XV SSA-770A, Japan) with a curved probe. Criteria for the diagnosis of ACKD was the presence of at least four bilateral renal simple cysts in small-to-normal sized kidneys with smooth appearances [8].

The data were analyzed using the SPSS software (Statistical Package for the Social Sciences, version 20.0, SPSS Inc, and Chicago, Ill, USA). Correlation was tested using the coefficient of correlation r according to Pearson Correlation (2-tailed). Univariate analysis was performed to check for normality. Student's t -test was performed for normally distributed variables, whereas Wilcoxon-Mann Whitney test was applied for all non-parametric variables. To assess the association between categorical variables, chi-square χ^2 test was applied. Differences were considered statistically significant at $p < 0.05$

Results:

Seventy- one patient with ESRD on Hemodialysis were screened for renal cysts. 44(60%) were male, and 27(37%) were female. The median duration of hemodialysis was four years (1-12 years). Sixty patients were on dialysis thrice weekly and 11 patients, twice a week. Thirty-three (46%) patients had one renal cyst, 26 (37%) patients had 2-5 renal cysts, and 12 (17%) patients had more than five renal cysts bilaterally (Table 1).

Table 1: Causes of End Stage Renal Disease in patients with Acquired Cystic kidney disease.

Thirty-five patients on Hemodialysis for three years or less had a median of three cysts, while 27 patients on HD for more than three years had a median number of 4.5 cysts (range 0-26), Table 2. Nine patients on HD for less than one year had multiple renal cysts (1-4). (Figure 1).

Table 2: Number of cysts in in patients with End Stage Renal Disease and Acquired Cystic kidney disease.

Number of Cysts Bilaterally	No. of patients (%)
0-1	33(46)
2-5	26(37)
>5	12(17)

There was no statistically significant association noted between number of cysts and diabetes ($p=0.245$), number of cysts and hypertension ($p=0.607$), number of cysts and obstructive uropathy ($p=0.520$), number of cysts and HCV ($p=0.25$). and between number of cysts and duration on dialysis ($p=0.276$). The only significant correlation seen was a negative correlation between number of cysts and uric acid ($p=0.025$).

Discussion:

Several studies have been performed to investigate the prevalence, incidence, and complications of ACKD in ESRD patients, following the discovery of bilateral cysts in patients on long-term hemodialysis by Dunnill and colleagues in the year 1977.⁹ Dunnill et al. found multiple renal cysts at autopsy in 14 of 30 hemodialysis patients. These patients did not have autosomal dominant polycystic kidney disease or other cystic disorders at the start of dialysis therapy. They postulated that these cysts were acquired and possibly were a consequence of maintenance hemodialysis. Several authors have observed similar cysts in patients with various renal diseases on hemodialysis.¹⁰⁻¹² The mean duration of dialysis in patients with no cysts and those with the acquired cystic disease were 15 months and 49 months, respectively.¹² In our study, the presence of cysts was confirmed by the consultant radiologist. The patients were diagnosed with ESRD and were receiving hemodialysis at our Dialysis Center for minimum of 1 years (1-4 years).

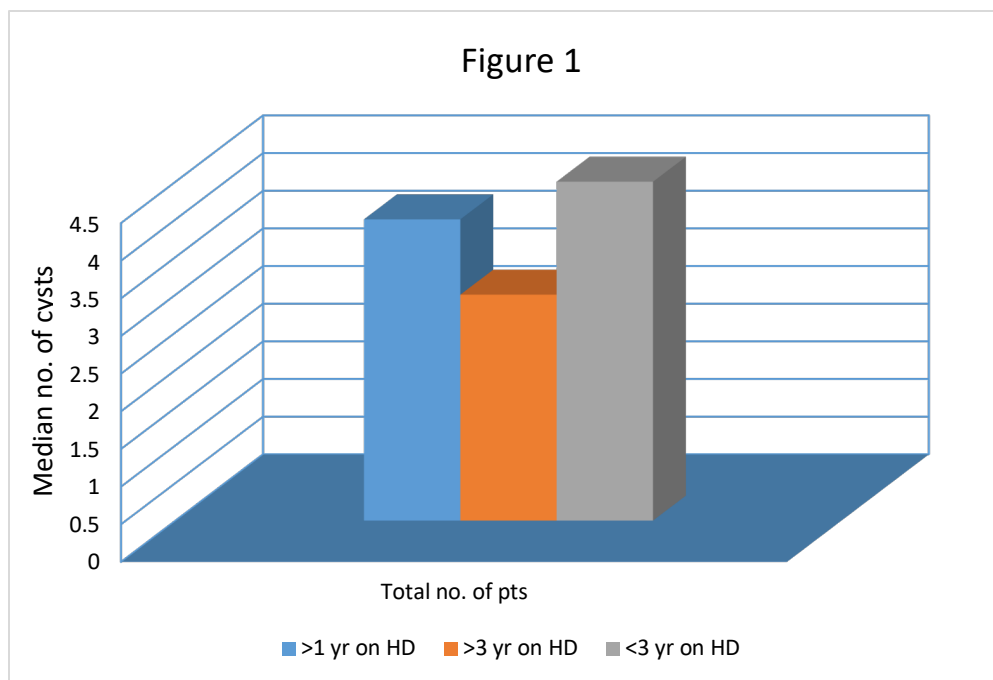


Figure 1: Hemodialysis duration among patients diagnosed with Acquired cystic Kidney Disease.

ACKD may have a gender bias as described by Ishikawa et al., noting a significantly larger number and size of cysts in male patients [4]. The same finding was seen in other studies as well, however we did not find higher number of cysts in males compared to females $p>0.05$. A study by Gnionsahe DA et al. observed similar insignificance of male preponderance similar to our study.¹³

In a study of 54 children on continuous ambulatory peritoneal dialysis, the prevalence of ACKD was 9%, 50%, and 80% among those who had been receiving peritoneal dialysis for four years or less, five to nine years, and longer than ten years, respectively [14]. In yet another study by Narasimhan et.al., 30 adult patients with chronic kidney disease (not yet on dialysis) and 100 hemodialysis patients were screened. The incidence of multiple cysts was noted to be 7% in those with chronic kidney disease and 22% in those on maintenance hemodialysis.

Progressive increase in the size of cysts has also been documented with the increasing duration of dialysis.¹⁵⁻¹⁷ Although we did not study the size of the cysts, we also did not find any correlation with the duration of hemodialysis and development of ACKD. This may be due to the short duration of follow up in our population, half of the patients were on dialysis ≤ 4 years. Nevertheless, almost all patients had renal cysts including those with hemodialysis duration less than one year. This may also reflect in part to the delayed initiation of HD since many patients refuse the idea of dialysis. This practice is common in developing countries such as Pakistan. A study carried out by Hussain S and colleagues in Pakistan in the year 2003, showed that 10% of patients developed ACKD while on dialysis for less than one year [18]. This study had its

limitations as it took patients on HD for one year only. Our study looked at patients on HD on a broader range of years from 1 to 12 years which explains the difference in results in a similar setting in Pakistan.

The correlation between coexisting diseases such as Hypertension and Diabetes, and the presence of cysts, in hemodialysis patients, showed no significance. In our study, there was no association between pre-existing conditions on the development of ACKD, and none of the patients had any extrarenal cysts, retroperitoneal or intrarenal hemorrhage.

Conclusion:

In conclusion, majority of the ESRD patients on HD presented with at least a single cyst, while others presented with multiple bilateral cysts. There was no significance between ACKD and the duration of dialysis as well as the presence of preexisting conditions. We suggest further longitudinal studies be performed on larger sample size and spanning over a longer time frame of HD to determine a temporal relationship.

Conflict of interest:

None declared

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