

The prevalence and clinical characteristics of adult polycystic kidney disease in Ilorin, Nigeria

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ABSTRACT

There is a dearth of information on the prevalence and clinical characteristics of adult polycystic kidney disease (APKD) in Nigeria. Earlier studies in the tropical developing countries have reported either the rarity or very low prevalence of this disease and more importantly as a cause of renal failure, but there are hardly any such studies focussing on the pattern of APKD in renal disease patients. The availability and increased use of imaging techniques have led to an increase in the recognition and diagnosis of cystic kidney disease. This longitudinal study was designed to determine the prevalence, clinical characteristics and prognosis of APKD in our environment.

All consecutive adult patients seen in the Renal Care Centre of the University of Ilorin Teaching Hospital over a 15-year period (July 1994-June 2009) were prospectively studied for the presence of APKD. It showed a progressive yearly increase in the number of cases. Seventy-eight out of 986 (8%) renal patients had polycystic kidney disease. The total age range was 25-60 years old with a mean of 49.8 ± 3.6 years and male to female ratio of approximately 2:1. Mean age of males and females was 52 ± 4.5 years and 45 ± 5.97 years respectively. The mode of presentation was chronic renal failure (32%), hypertension (21%), abdominal pain (11%), abdominal swelling (4%) and urinary tract infection (3%) while 21% of

cases were incidental findings. Six patients were lost to follow-up while 17 died, giving an approximate mortality rate of 24%. The majority of the mortality recorded in the study was due to septicaemia complicating terminal renal failure. Females presented a decade earlier than the males and with faster progression to ESRD.

It is concluded that APKD is not uncommon and is an important cause of morbidity and mortality in our environment. We therefore recommend that females with this disease should be monitored more closely.

Key-Words:

Adult polycystic kidney disease (APKD); clinical characteristics; prevalence; prognosis.

INTRODUCTION

Adult polycystic kidney disease is the most common life-threatening hereditary kidney disorder with extrarenal complications and a very important cause of end stage renal disease (ESRD) in Caucasians¹⁻³. The two most common types of APKD are autosomal dominant polycystic kidney disease (ADPKD) and autosomal recessive polycystic kidney disease (ARPKD). Both are progressive bilateral disease that

can occur in adults and may present with polycythaemia, subarachnoid haemorrhage, ruptured aneurysm, severe hypertension, significant enlargement of abdominal organs and often lead to renal failure in the majority of cases^{4,5}. There are at least three genetic mutations in ADPKD (PKD-1, PKD-2, PKD-3) that are responsible for polycystic kidney disease with the mutation of PKD-1 located on chromosome 16p while that of PKD-2 is on chromosome 4q. Some studies in the tropical environment, including Nigeria, have documented the rarity of polycystic kidney disease as a cause of chronic renal failure^{6,7} in contrast to other diseases in which the incidence in blacks and Caucasians are similar^{8,9}. The racial difference in the prevalence of APKD is difficult to explain as the disease is a genetic disorder.

The paucity of data on APKD in Nigeria may have been responsible for the notion that it is rare among our renal patients. The availability and increased use of ultrasonography in many of our hospitals within the last two decades prompted us to evaluate all patients seen in our centre for APKD. This longitudinal study was undertaken with the aims of defining the prevalence, clinical characteristics and prognosis of APKD in Ilorin.

■ PATIENTS AND METHODS

All consecutive adult patients seen in the renal care centre of the University of Ilorin Teaching Hospital (UIITH) Ilorin, over a 15-year period (July 1994-June 2009) were prospectively studied. The presence of APKD was evaluated by detailed history, thorough physical examination, abdominal ultrasound and intravenous urogram. Blood and urine samples were collected from all APKD patients for full blood count, erythrocyte sedimentation rate (ESR), blood urea, serum creatinine and electrolytes, urine analysis, microscopy and culture. A 24-hour urine collection for protein estimation and creatinine clearance was performed. The criteria for the diagnosis of APKD in the study included most of the following: presence of at least three bilateral renal cysts as most of the patients were more than 25 years of age, presence of cysts in other intra-abdominal organs, positive family history of bilateral cystic kidney disease, documentation of extrarenal manifestation of the disease, presence of culprit gene by gene linkage

analysis, enlarged kidneys with multiple echo-free areas in both kidneys, intravenous urographic demonstration of thinning and angulation of the collecting system with moth-eaten appearance of the cortex and impaired urine concentrating ability. There were logistic problems in screening most family members of patients for APKD either due to unwillingness or refusal of first degree relatives. The routine screening of family members still remain a contentious issue as the knowledge may likely evoke anxiety and decrease job opportunity in our environment.

■ RESULTS

Seventy-eight out of 986 (8%) renal patients had polycystic kidney disease (Figure 1). It showed a progressive yearly increase over the preceding ten years (Figure 2). The total age range was 25-60 years with a mean of 49.8 ± 3.6 years and male to female ratio of approximately 2:1. Males had age range of 30-60 years with a mean of 52 ± 4.5 years while females had age range of 25-56 years with a mean of 45 ± 5.97 years. The peak age incidence was in the 4th and 5th decade for females and males respectively. The most common mode of presentation (Table I) was chronic renal failure (32%) followed by hypertension (21%), abdominal pain (11%), abdominal swelling (4%) and urinary tract infection (3%). About 21% of cases were incidental findings referred to our centre from other departments and private hospitals. Six patients were lost to follow-up while 17 died, giving

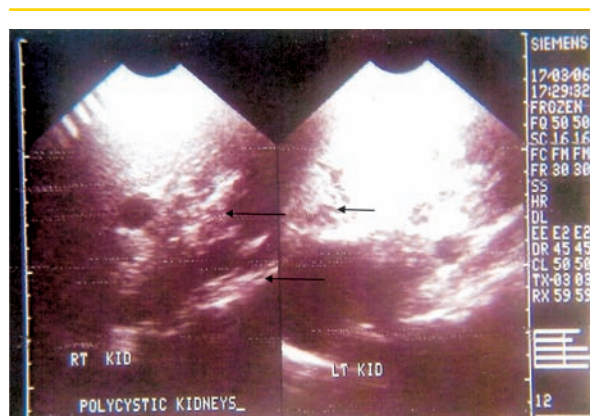


Figure 1

Sonographic picture of polycystic kidney disease.

Table 1

Mode of presentation of polycystic kidney disease patients

Presentation	No of patients	% of total patients	No of males(%)	No of females(%)
Chronic renal failure	25	32.05	18 (40)	7(21.2)
Hypertension	21	26.92	13 (28.9)	8 (24.2)
Abdominal pain	11	14.10	4 (8.9)	7(21.2)
Abdominal swelling	3	3.84	-	3 (9.1)
Urinary tract infections	2	2.56	-	2 (6.1)
Incidental findings	16	20.51	10 (22.2)	6 (18.2)
Total	78	100	45 (100)	33 (100)

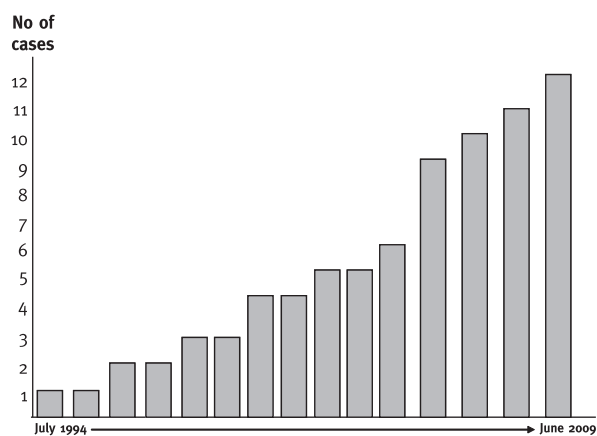


Figure 2

Yearly distribution of polycystic kidney disease.

an approximate mortality rate of 24%. The majority of the mortality recorded in the study was due to septicaemia complicating severe uraemia as patients could not afford renal replacement therapy.

DISCUSSION

Adult polycystic kidney disease is the most frequent genetic cause of renal failure in adults, accounting for 6-10% of ESRD cases in America and Europe^{1,4} This hospital-based prevalence rate of 8% in our renal patients shows that it is not rare in our environment. It is likely to be higher if other imaging techniques are combined with ultrasound in community-based multicentre studies as black race and male gender are recognised risk factors for progressive disease in APKD^{1,9,10} Ultrasonography,

the preferred diagnostic method in most studies, was used because of its high sensitivity, low cost and lack of exposure to radiation or contrast materials. In individuals with very small or indistinct cysts, T-1 weighted magnetic resonance imaging (MRI) is more sensitive and can identify renal cysts as small as 3mm in diameter¹¹. This contrasts with ultrasonography which can reliably detect cysts that are 1cm or larger in diameter¹². The sensitivity of ultrasound for the diagnosis of APKD is almost 100% for those aged 30 years and above¹⁰. The advantage of CT scan with contrast enhancement and magnetic resonance imaging is that it can pick out inherited renal cystic disease in persons aged under 30 years old who do not have ultrasound detectable renal cysts¹³. MRI is also useful in the measurement of cyst volume, monitoring cyst growth and assessing progress of the disease¹⁴. However, persons at risk of APKD without sonographically defined cyst can benefit from gene linkage technique and perinatal diagnosis is also possible, using DNA obtained by amniocentesis or chorionic-villus sampling^{15,16}. The mean age of 49.8±3.6 observed in this study is comparable with the findings of other researchers^{1,8,9}. There was gender disparity in the mean ages and ratio of the population studied. The male to female ratio was approximately 2:1 while the mean ages were 52.5±4.5 and 44.9±5.97 for males and females respectively. The gender ratio of 2:1 noted in this population contrasted with the equal ratio finding in other studies^{1,8,9,17}. The reason for the gender disparity is not clear. This may be related to the group of patients studied as they were mainly renal patients seen in a hospital setting. Culture and healthcare seeking patterns of the population may have contributed to the disparity. The cultural preference for male children and the males being the predominant bread winners of the families puts the males at an

advantage in seeking healthcare from a tertiary health facility in our environment. The females in this study presented a decade earlier than males. It may be that the disease runs a more benign course in males as increased oestrogen levels and repeated pregnancies promote massive cyst enlargement and worsen hypertension in females with APKD¹⁸. It is also possible that the more aggressive course of the disease in females may have led to its presentation at a younger age than in males. It appears from this study that females with APKD may need closer monitoring than the males. The recognised features of APKD include chronic abdominal pains, haematuria, infections, nephrolithiasis, hypertension, valvular heart disease, aneurysm of blood vessels, liver and pancreatic cysts, chronic renal failure and diverticulitis of the colon¹⁹. Even though our patients did not undergo gene linkage analysis, they met the clinical criteria for the diagnosis of autosomal dominant polycystic kidney disease¹⁰. The most common mode of presentation in our patients was chronic renal failure, followed by systemic hypertension, abdominal pain, abdominal swelling and urinary tract infection, in that order. The mode of presentation of APKD varies in different studies¹⁹. Rale *et al.*²⁰ observed that heaviness and pains in the flanks, which were often associated with haematuria and urinary tract infections, are the main features while Martinez-Maldonado²¹ reported that the hallmark of the disease was impaired concentrating ability resulting in urinary frequency and nocturia. Dalgaard²² in a related study noted that haematuria was the most common presentation followed by systemic hypertension and palpable renal mass, in decreasing order. About 21% of our cases were incidental findings. This is not surprising as some cases are diagnosed post-mortem while others may have developed complications such as hypertension and chronic renal failure from three to twelve years after diagnosis of APKD²³. It is also true that family history may be absent in some proven cases of APKD^{22,23}. An approximate mortality rate of 24% was recorded in this study. The majority of the deaths were due to septicaemia complicating terminal renal failure as patients could not afford renal replacement therapy. Adult polycystic kidney disease is a common cause of ESRD and studies have shown that more than 50% would have reached ESRD by the age of 60 years^{20,22}. The contributory factors to faster rate of progression to ESRD include male gender, PKD-I genotype, hypertension, young age at diagnosis,

increased left ventricular mass, multiple pregnancies, multiple episode of haematuria, urinary tract infections and hepatic cysts in women^{18,19,23}. The usual age at which ESRD develops in APKD has increased by 10 years between the period from 1985-1992 and period from 1992-2001 and the improvement has been attributed to increased use of rennin-angiotensin system inhibitors for the management of hypertension^{24,25}. Hypertension is one of the most common manifestation of APKD which has been found to be present in 50-75% of cases even when renal function is normal and is usually associated with left ventricular hypertrophy^{24,26}. Despite the therapeutic advances which have improved kidney function and survival of patients with APKD among Caucasians, cardiovascular disease still remain the leading cause of death^{17,26}. It has recently been observed in studies that atherosclerosis starts at an early stage in the course of the disease²⁷. In contrast to the findings among Caucasians, the leading cause of death in our environment was terminal renal failure. This is because patients can hardly afford the cost of renal replacement therapy, resulting in their early death from uraemia. In Europe and America, cardiovascular pathology and infections account for about 90% of deaths in those treated by dialysis and/or transplantation^{23,24,28}. Urinary tract infection (UTI) was the mode of presentation in 3% of our cases and these were all females. Women are more susceptible to UTI with high incidence of parenchyma and cyst infections than men^{26,29}. Abdominal pain was observed in 11% of our patients. This is a symptom that may pose a diagnostic challenge in patients with APKD as they may develop severe pains for reasons completely unrelated to their underlying disease. While abdominal pains may be caused by cyst enlargement, blood clot from severe bleeding, perinephric haematoma, cyst infections, perinephric abscess, nephrolithiasis and rarely coincidental hypernephroma, severe pains may occur in the absence of apparent renal complications³⁰. The cause of the abdominal pains in the majority of our APKD patients that presented with abdominal pains could not be traced to the underlying disease. This is not unexpected as patients with unexplained abdominal pains are likely to be subjected to ultrasonography. It is concluded that APKD is not uncommon and is an important cause of morbidity and mortality worldwide. The incidence of the disease appears to be on the increase in our environment. As routine screening of family members of patient

with APKD still remain a contentious issue, we recommend that symptomatic family members or those that develop hypertension, haematuria and proteinuria should be screened for APKD. The disease appears to run a more aggressive course in females resulting in its presentation at a younger age in females than males. The higher proportion of males than females that presented with advanced chronic renal failure in this study support the observation that male gender is a risk factor for progressive renal disease in APKD²³. It appears from the study that females with APKD may need closer monitoring than males in the early stages of the disease.

Conflict of interest statement. None declared.

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