

Prevalence of ultrasound-diagnosed asymptomatic simple renal cysts at the University College Hospital, Ibadan

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Abstract

Background: Renal cysts are thin-walled sacs of fluid that form within the renal parenchyma which may be simple or complex. Most simple renal cysts are asymptomatic and are found usually incidentally by ultrasonography and computed tomography. However, a small proportion may become symptomatic with pain being the most common symptom. The aim of the study is to determine the prevalence of asymptomatic simple renal cysts in patients presenting for abdominal ultrasound (US) and the associations of simple renal cysts with age and gender.

Materials and Methods: This was a retrospective study which involved the retrieval of the results of abdominal US performed at the Radiology Department of the University College Hospital between January 2013 and December 2015. Data extracted included age, sex, and renal sonographic findings. The retrieved data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20.0 software.

Results: Two thousand and ninety-five patients had abdominal US done during the study period. The overall prevalence of asymptomatic simple renal cysts was 2.3% with the prevalence increasing with age ($P < 0.001$). Simple renal cysts were found in 2.3% of both males and females with a male-to-female ratio of 1:1.3. The mean widest diameter of renal cysts was 45 mm with a range between 15 mm and 105 mm. The cyst diameter tended to increase with age, but the correlation with age was not statistically significant ($P = 0.278$). The majority of the cysts were solitary (87.8%) with the right kidney having majority (59.2%) of the cysts.

Conclusion: The overall prevalence of simple renal cyst in our study is 2.3% and it increased with age. Since simple renal cysts have been associated with some conditions and complications such as hypertension, polycythemia, hemorrhagic transformation, and cyst rupture, adequate follow-up is necessary to enable the prompt detection of complications and adequate intervention if the need arises.

Keywords: Asymptomatic, prevalence, renal cyst, simple, ultrasound

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INTRODUCTION

Renal cysts are thin-walled sacs of fluid that form within the renal parenchyma which may be simple or complex.^[1] Simple renal cysts are benign masses of the renal parenchyma, and the diagnostic importance in radiology is

the differentiation from carcinoma of the kidney.^[2] Renal cysts are rare before the age of 30 years, but the incidence steadily increases thereafter.^[2]

A simple cyst is the most frequently observed renal lesion with an overall prevalence of 17.2%.^[3] The prevalence

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increases with age and reaches 20% at age 50 years.^[4] Moreover, as age advances, it becomes more likely that a kidney would contain more than one cyst.^[5] Studies have reported that dimensions of cysts increase with age,^[3,6] with the mean diameter doubling after the fifth decade.^[5] These cysts have been reported to be more frequent in men^[3,6,7] with some literature reporting renal cysts to be twice as frequent in men when compared to women.^[4,8] When a simple cyst is present, it is most often located in the upper pole of the kidney.^[6]

A simple renal cyst is believed to be an acquired disorder^[9,10] precipitated by a combination of obstruction of renal tubules and normal involution phenomena of the basal membrane, both typical of the aging process.^[9] On histology, a simple renal cyst usually has a smooth outline bordered by a single layer of flattened cuboidal epithelium and is filled with clear or straw-colored fluid.^[11]

Most simple renal cysts are asymptomatic and are found usually incidentally by ultrasonography and computed tomography (CT).^[12] They are usually of no clinical significance; however, a small proportion may become symptomatic with pain being the most common symptom.^[12] Other less common symptoms or complications of simple renal cysts include hematuria, hypertension, pelvicalyceal obstruction, and cyst rupture.^[13] When cysts are very large, they may produce the mechanical effects of a space-occupying lesion.^[12] On ultrasound (US), simple renal cysts are defined as sharply marginated, thin, smooth-walled anechoic masses showing posterior acoustic enhancement,^[14] while on CT, simple cysts are defined as thin-walled renal masses of uniform density, with an attenuation coefficient approximating to water value, which were not enhanced by intravenous contrast medium.^[15]

Asymptomatic simple cysts are not usually treated; however, some physicians choose to follow-up patients with the cysts for possible complications. When a simple cyst presents with symptoms, it is usually aspirated under US guidance and cytology is done on aspirated fluid to check for malignant cells. A sclerosant is added after aspiration to provoke inflammation, leading to adhesion of the wall and reduction or resolution of the cyst.^[12] Where cyst aspiration and sclerotherapy do not improve symptom or there is a recurrence of simple cyst, laparoscopic ablation of the cyst is advocated.^[12]

This study seeks to determine the prevalence of asymptomatic simple renal cysts among the patient population and association with age and sex.

MATERIALS AND METHODS

This was a retrospective cross-sectional study carried out at the Radiology Department of University College Hospital, Ibadan, Oyo state. US reports and request cards of all the patients who had abdominal US scan done in the Radiology Department between January 2013 and December 2015 were retrieved. Data retrieved from the results included age, sex incidental findings of simple renal cyst, and the number of cysts found. Simple renal cysts recorded fulfilled the Bosniak renal cyst classification system^[16] [Table 1] Category 1 renal cyst criteria as round/oval shaped; thin, smooth-walled; anechoic lesion with posterior acoustic enhancement; and no internal debris or septa [Figures 1 and 2].

Data analysis was done by simple proportion and percentages using the Statistical Package for the Social Sciences (SPSS, IBM Corp., Armonk, NY) version 21.0 software. The association of asymptomatic simple renal cyst with age and sex of participants was determined. $P < 0.05$ was regarded as being significant.

RESULTS

A total of 2095 patients (1200 females and 895 males) had abdominal US done during the study period. Simple renal cysts were observed in 49 of the 2095 patients giving an overall prevalence of 2.3% [Table 2]. No cyst was found in participants younger than 20 years of age. Thereafter, the incidence increased with age, with the largest number occurring in patients in the sixth decade [Figure 3]. Therefore, the prevalence tended to increase with age with a significance of $P = 0.000$. Simple renal cysts were found in 21 males and 28 females with a prevalence of 2.3% and a male-to-female ratio of 1:1.3 [Table 3]. The mean widest diameter of the renal cyst was 45 mm with

Table 1: Bosniak classification of renal cysts

Category 1	Simple benign cyst with (1) good through-transmission (i.e. Acoustic enhancement), (2) no echoes within the cyst, (3) sharply, marginated smooth wall; requires no surgery
Category II	Looks benign with some radiologic concerns including single thin septation, minimal calcification; requires no surgery
Category IIF	Although calcification in wall of cyst may be thicker and more nodular than category II. The septa has minimal enhancement, especially those with calcium; requires no surgery
Category III	More complicated lesion that cannot be confidently distinguished from malignancy, having more calcification, multiple septations of thicker walls than category II lesion. More likely to be benign than malignant; requires surgical exploration and/or removal
Category IV	Clearly a malignant lesion with large cystic component, irregular margin, solid vascular elements; requires surgical removal



Figure 1: Longitudinal ultrasound scan through the right kidney of a patient showing a simple cyst (arrows) in the anterior mid pole

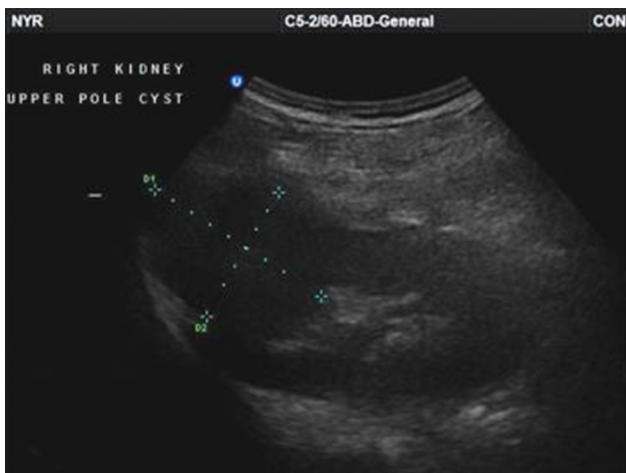


Figure 2: Longitudinal ultrasound scan of the right kidney of another patient showing a simple cyst (calipers) at the upper pole of the right kidney

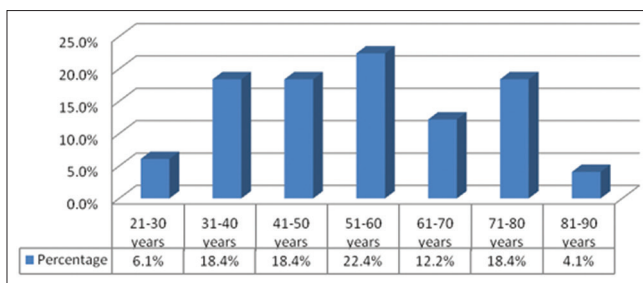


Figure 3: Simple renal cysts distribution by age group

a range of 15–105 mm and this increased with age with a peak at 58 years. The correlation with age was, however, not statistically significant ($P = 0.278$). Regarding the distribution of the site of the cysts, right, left, and bilateral kidneys were affected in 29, 16, and 4 individuals, respectively [Table 4]. Only 6 of the patients had multiple cysts, and these were found in the groups between 31 and 80 years. Two of these were in the 31–40-year age group,

Table 2: Distribution of Renal cysts among the different age-groups

Age group	Number	Number with Renal Cysts	Prevalence (%)	P
1-10	205	0	0	0.000
11-20	156	0	0	
21-30	307	3	1	
31-40	416	9	2.2	
41-50	352	9	2.6	
51-60	274	11	4.0	
61-70	207	6	2.9	
71-80	126	9	7.1	
81-90	26	2	7.7	
91-100	26	0	0	

Table 3. Distribution of renal cysts by gender

Sex	Number	Number with Renal Cyst	Percentage (%)	P
Female	1200	28	2.3	0.984
Male	895	21	2.3	
Total	2095	49	2.3	

Table 4: Relationship between gender and the affected kidneys

Sex	Right kidney Cysts (%)	Left kidney Cysts (%)	Cysts in both kidneys (%)	Total number with Cysts (%)
Female	19 (67.9)	9 (32.1)	0 (0.0)	28 (57.1)
Male	10 (47.6)	7 (33.3)	4 (19.1)	21 (42.9)
Total	29 (59.2)	16 (32.7)	4 (8.1)	49 (100)

Table 5: Relationship between the number of cysts and age-groups

Age Group	Cyst (Single)	Cyst (Multiple)	Total
1-10	-	-	-
11-20	-	-	-
21-30	3	-	3
31-40	7	2	9
41-50	8	1	9
51-60	10	1	11
61-70	5	1	6
71-80	8	1	9
81-90	2	-	2
Total	43 (87.8%)	6 (12.2%)	49 (100%)

while the remaining age groups had one patient each with multiple cysts [Table 5].

DISCUSSION

In this study, the overall prevalence of simple renal cyst was 2.3% with the highest prevalence seen in the sixth decade. This prevalence is much lower than those of some other series,^[3,5,7,8,17,18] where the prevalence of simple renal cysts varied between 5.06% and 41%. However, in a study conducted at Ilorin, Nigeria, among patients with renal diseases, the prevalence of US-diagnosed asymptomatic renal cyst was 1.6%,^[19] whereas Nko'o Amvene *et al.*^[20] at Yaoundé found a prevalence of 3.08% in their population. The wide difference in reported prevalence may be due to the population studied as well as the imaging modality

used. The resolution of the imaging modalities used may also be a much stronger factor than many researchers' thought.^[14] It was also observed that authors who studied patients with US reported lower values when compared with others that used computed tomography as the study imaging modality. This may be because CT is known to have a higher sensitivity over ultrasonography in the detection of renal cysts.^[7]

Similar studies done using US reported prevalence ranging between 5.06% and 15%.^[3,7,17,21] Terada *et al.*^[21] in 2004 studied Japanese participants using US reported a prevalence of 9.9%. Chang *et al.*^[7] reported 10.7% while studying Taiwanese participants using US in 2007. However, studies done using CT reported much higher prevalence ranging from 24% to 41%.^[5,18,22] Laucks and McLachlan^[5] utilized CT to study the kidneys of participants in the USA in 1980 and reported a prevalence of 24%,^[5] whereas Carrim and Murchison^[18] in 2003 reported a much higher prevalence of 41% examined the participants in Scotland which is very close to findings at autopsy.

Some of the factors that may account for the low sensitivity of US in the detection of simple renal cyst when compared to CT include its being operator dependent, greater reliance on patient cooperation, and wider interobserver variability. However, although CT is more sensitive in the detection of renal cysts, the use of ionizing radiation by CT and its higher cost makes its utilization for a large-scale research on asymptomatic patients relatively unattractive.

Renal cysts tend to be rare before the age of 30, but the incidence steadily increases thereafter.^[2] In our study, no cyst was found in individuals younger than 20 years. This is similar to that reported by Nko'o Amvene *et al.*,^[20] Chang *et al.*,^[7] and Yamagishi *et al.*^[6] However, Laucks and McLachlan^[5] in their study reported the absence of cysts in patients under the age of 40 years. This may be due to the fact that a 10 mm CT slice thickness was used which could have missed out smaller cysts in the younger age.

A number of studies reported that the number of renal cysts as well as the diameter of the cysts tend to increase with age.^[3,5-8,17] In our study, only 12.2% of the patients had multiple cysts, and this did not increase with age. However, the cyst diameter in our participants increased with age with a peak among the 51–60-year age group. The correlation with age was, however, not statistically significant. This finding is similar to that reported by Pal *et al.*^[17] and Yamagishi *et al.*^[6] but at variance to the findings of Chang *et al.*,^[7] who did not record any correlation with age. This

is possibly due to the use of different diagnostic tools, sonographic resolution as well as the population studied.

In our study, there was a slight female preponderance which is similar to findings by Laucks and McLachlan.^[5] However, it is at variance with findings by some authors who reported higher male prevalence.^[3,7,23] Chang *et al.*^[7] in 2007 reported male-to-female ratio of 2.81:1, Terada *et al.*^[21] in 2004 reported a male-to-female ratio of 2.24:1, Caglioti *et al.*^[3] reported a male-to-female ratio of 1.85:1, while in a study conducted at Ilorin, Nigeria, by Chijioke *et al.*,^[19] the male-to-female ratio was 1.3:1. Nko'o Amvene *et al.*^[20] and Yamagishi *et al.*,^[6] however, recorded no sex predilection.

More cysts were found in the right kidney than in the left in this study which corroborates with finding by Chijioke *et al.*,^[19] Chang *et al.*,^[7] and Gameraddin and Babiker.^[24] However, similar studies done using CT^[15,18] reported no difference in the prevalence of renal cyst in right or left kidney. This variance may be explained by the easy access of the right kidney than the left during sonographic examinations, but no explanation for these findings was found in the literature and previous studies.^[24]

CONCLUSION

The overall prevalence of simple renal cyst in our study is 2.3% and it increased with age. Since simple renal cysts have been associated with some conditions such as hypertension, polycythemia, hemorrhagic transformation, and cyst rupture, adequate follow-up is necessary to enable the prompt detection of complications and adequate intervention if and when they arise. Furthermore, since this is a retrospective study, the risk factors for the development of simple renal cyst were not considered. However, a future prospective study that will take into cognizance the risk factors for this condition in this environment, especially tobacco smoking will be considered.

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Conflicts of interest

There are no conflicts of interest.

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