Original Research Article

Common findings in Ultrasound Examination of the Liver and Kidney in Sokoto Metropolis

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Authors' contributions

ABSTRACT

Objectives: *To evaluate and document common findings in ultrasound examination of the liver and kidneys in Sokoto metropolis and to reveal gender and age distribution of the findings in these organs.*

Materials and methods: *The data was collected retrospectively from the hospital archives and records using a data capture sheet.*

Results: *Total sample of 322 ultrasound reports of the liver and kidneys in which some patients had two findings, one in the liver and another in the kidney, some had liver findings only, some kidney findings only, while some had normal ultrasound examination. Liver findings recorded a dominant male gender with a frequency of 75 (70.1%). Findings in the liver reported were liver cirrhosis, hepatomegaly, fatty liver, primary liver cell carcinoma, hepatic metastasis, chronic liver disease (CLD), hepatitis, hepatoma and liver cyst. Liver cirrhosis had the highest frequency with 29 (27.1%), hepatomegaly with a frequency of 17 (15.9%) followed by fatty liver and plcc*

with a frequency of 13 (12.1%) each. The age range of 40-49 years had the highest frequency for the liver findings with 23 (21.5%), followed by 60-69 years with 18 (16.8%) while 10-19 years had the least frequency with 3 (2.8%). For the kidney findings, male gender also dominated the findings with a frequency of 107 (64.1%). The age range that had the highest frequency was 20-29 years with 43 (25.7%), followed by 30-39 years with a frequency of 27 (16.2%). The age range with the least frequency was 80-89 years with 6 (3.6%). The pathological kidney findings reported were pyelonephritis, renal parenchyma disease (grades I, II, III, and IV), hydronephrosis, renal calculi, renal cyst, ectopic kidney, renal mass, renal failure and nephrotic syndrome. Pyelonephritis was recorded as the commonest finding with a frequency of 67 (40.1%), followed by renal parenchymal disease with 35 (21.0%).

Conclusion: *The study revealed that male gender is at higher risk of having both liver and kidney diseases in Sokoto metropolis than the female and the age of those at higher risk ranged from 20-49 years.*

Liver cirrhosis and pyelonephritis are the commonest diseases of the liver and kidneys respectively.

KEYWORDS: Ultrasound, Liver, Kidneys, Metropolis, Echogenicity.

1.0 INTRODUCTION

Ultrasound machines use high frequency sound waves to produce images of diagnostic quality [1]). They generate sound waves and receive the reflected echoes from the body tissues to which the sound waves are applied to and these waves are emitted from piezoelectric crystals from the ultrasound transducer. The piezoelectric crystals changes the electrical signals to mechanical vibrations and changes mechanical vibrations to electrical signals [2]. As the ultrasound waves pass through various body tissues, they are reflected back to the transducer creating an image on the ultrasound screen [3].

Ultrasonography of the liver and kidneys involves scanning the patient's right upper quadrant and left and right flanks respectively from different planes with patients placed in various positions in order to help the sonographer to visualize and evaluate the normal anatomy of the organs and as well detect abnormalities related to the organs [4, 11]. Ultrasound is a good modality for imaging the Liver and the kidneys due to its ability to

demonstrate their anatomy which makes it easier to detect pathology, its availability, low cost, non-invasive and do not use ionising radiation.

The liver sonographically appears slightly more echogenic than the renal cortex. It has a homogeneous echo texture except for the anechoic (echo free) blood vessels and the gall bladder [1]. The following are common indications for liver Ultrasonography: Hepatitis, liver cirrhosis, fatty liver, Abscess, Liver cyst, Hepatomegaly, Hepatocellular carcinoma, Portal hypertension, Hepatic calcification, etc. [1].

Renal ultrasound (US) is a common examination, which has been put to practice in diagnosis of renal pathology and assessment of renal anatomy for decades [5]. Sonography is an essential tool in nephrology which is not only used in the diagnosis and management of kidney disease, but also for the guidance of invasive procedures which is non as interventional sonography. For this reason, it is essential for nephrologists to have a thorough understanding of sonography and its uses in nephrology. Technological advances over the past 15 years have resulted in high-quality scanners that are both portable and affordable, which has greatly expanded the use of point-of-care sonography by clinicians. Although nephrologists have been lagging in this area, an increasing number are incorporating sonography into their practice, and training programs are finally starting to meet this need [6].

Sonographically, the renal cortex is usually less echogenic than the liver and the spleen, but in young infants is isoechoic or slightly hyperechoic with respect to these organs. The central renal sinus appears hyperechoic than the renal cortex, the liver and the spleen [1].

Because of their location, architecture, and limited spectrum of pathology, the kidneys are ideally suited for evaluation by ultrasound. In addition, it is safe, readily available, easily performed at the bedside or in the office, and free of radiation. For these reasons, sonography is the preferred imaging modality and often the only one required. Evaluation includes assessment of the size and shape, the echogenicity, the urinary space (including the lower urinary tract), the presence of masses, and the vasculature [6].

2.0 MATERIALS AND METHOD

The study adopted the retrospective cross-sectional survey. A total of 1,651 sonographic reports, produced between January 2017 and June 2018, were retrieved from the records of the Radiology, Urology and Medicine Departments of Usmanu Danfodiyo University Teaching Hospital University Sokoto (UDUTHS) and Specialist Hospital Sokoto (SHS), Sokoto State and evaluated. A secondary source of data was used and was recorded using data capture sheet. A non-probabilistic (convenient) sampling technique was used in selecting data. A convenient sampling technique was used for the study with Yaro Yamane's formula used for sample size determination which was 322 Ultrasound reports of the liver and the kidneys with patients' details such as Gender, Age and date of the examination with sonographic reports [7].

Data obtained were subjected to descriptive statistics and analysed using analysis of variance.

3.0 RESULTS

The total number of data collected or sample size used was 322 with a gender distribution of males, 207 (64.3%) and females, 115 (35.7). It has a mean of 39.2 and a standard deviation of 28.0.

Table 3.1 shows gender and age distribution for the subjects with male gender recording the highest frequency and the age range of 20-29 years having the highest frequency

Table 3.2 shows the frequency and percentage of the general findings base on the organs affected and those that had normal sonographic examination.

Table 3.3 shows gender and age distribution for the pathological liver findings with male gender recording the highest frequency and the age range of 40-49 years recording the highest frequency

Table 3.4 shows gender distribution, frequency and percentage of pathological liver findings. Liver cirrhosis was the pathology of the liver with the highest frequency. Male gender had highest frequency.

Table 3.5 shows gender and age distribution of pathological kidney findings with the male gender also recording the highest frequency, and the age range of 20-29 years recording the highest frequency.

Table 3.6 shows gender distribution, frequency and percentage of pathological kidney findings. Pyelonephritis is seen to be the most common kidney pathology.

Table 3.1:Gender and age distribution for the subjects

GENDER	**FREQUNCY**	**PERCENTAGE (%)**
Male	207	64.3
Female	115	35.7
TOTAL	**322**	**100**
AGE RANGE (YEARS)		
0-9	29	9.0
10-19	30	9.3
20-29	63	19.6
30-39	48	15.0
40-49	53	16.5
50-59	30	9.3
60-69	37	11.5
70-79	22	6.8
80-89	10	3.1

TOTAL	**322**	**100**

Table 3.2 :Frequency and percentage of all the findings

ORGAN	FREQUENCY	PERCENTAGE (%)
Liver only	90	28.0
Kidneys only	150	46.6
Both liver and kidneys	17	5.3
Normal findings	65	20.2
TOTAL	**322**	**100**

Table 3.3: Gender and age distribution for liver findings

AGE RANGE (YEARS)	GENDER		FREQUENCY	PERCENTAGE (%)
	M	F		
< 20	6	4	10	9.3
20-29	6	2	8	7.5
30-39	12	4	16	15.0
40-49	16	7	23	21.5
50-59	11	6	17	15.9
60-69	11	7	18	16.8
70-79	7	2	9	8.4
80-89	5	1	6	5.6
TOTAL	**74**	**33**	**107**	**100**

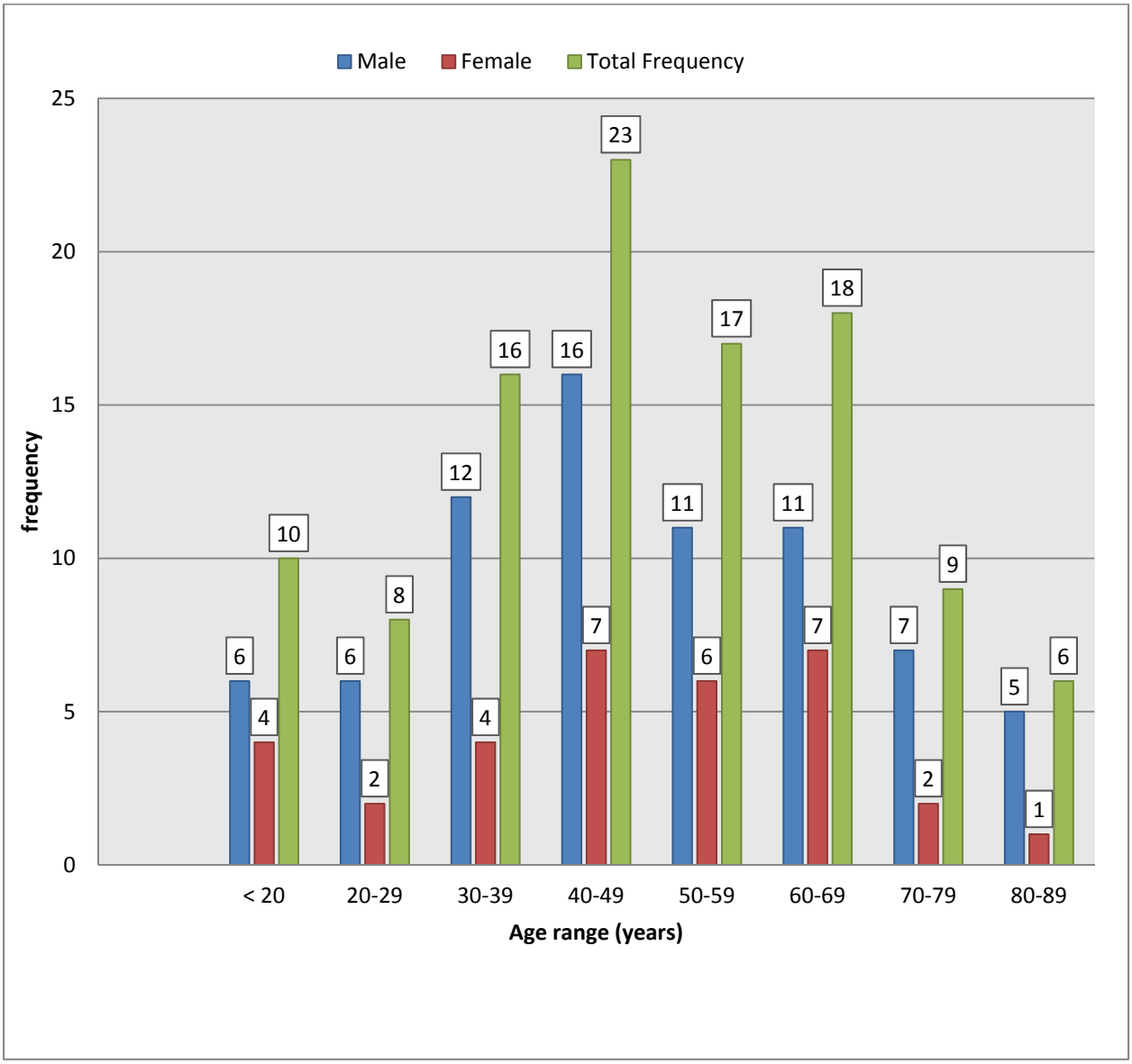

Figure 3.1: A bar chart showing gender and age distribution for liver findings

Table 3.4: Gender distribution, frequency and percentage of pathological liver findings

PATHOLOGY	GEMNDER		FREQUENCY	PERCENTAGE (%)
	M	F		
Liver cirrhosis	18	11	29	27.1
Hepatomegaly	12	5	17	15.9
Fatty liver	7	6	13	12.1
PLCC	11	2	13	12.1
Liver metastasis	6	3	9	8.4
CLD	6	2	8	7.5
Hepatitis	5	2	7	6.5
Hepatoma	3	1	4	3.7
Hepatorenal syndrome	2	0	2	1.9
Sepsis	2	0	2	1.9
Liver cyst	2	0	2	1.9
Liver failure	0	1	1	0.6
TOTAL	**74**	**33**	**107**	**100**

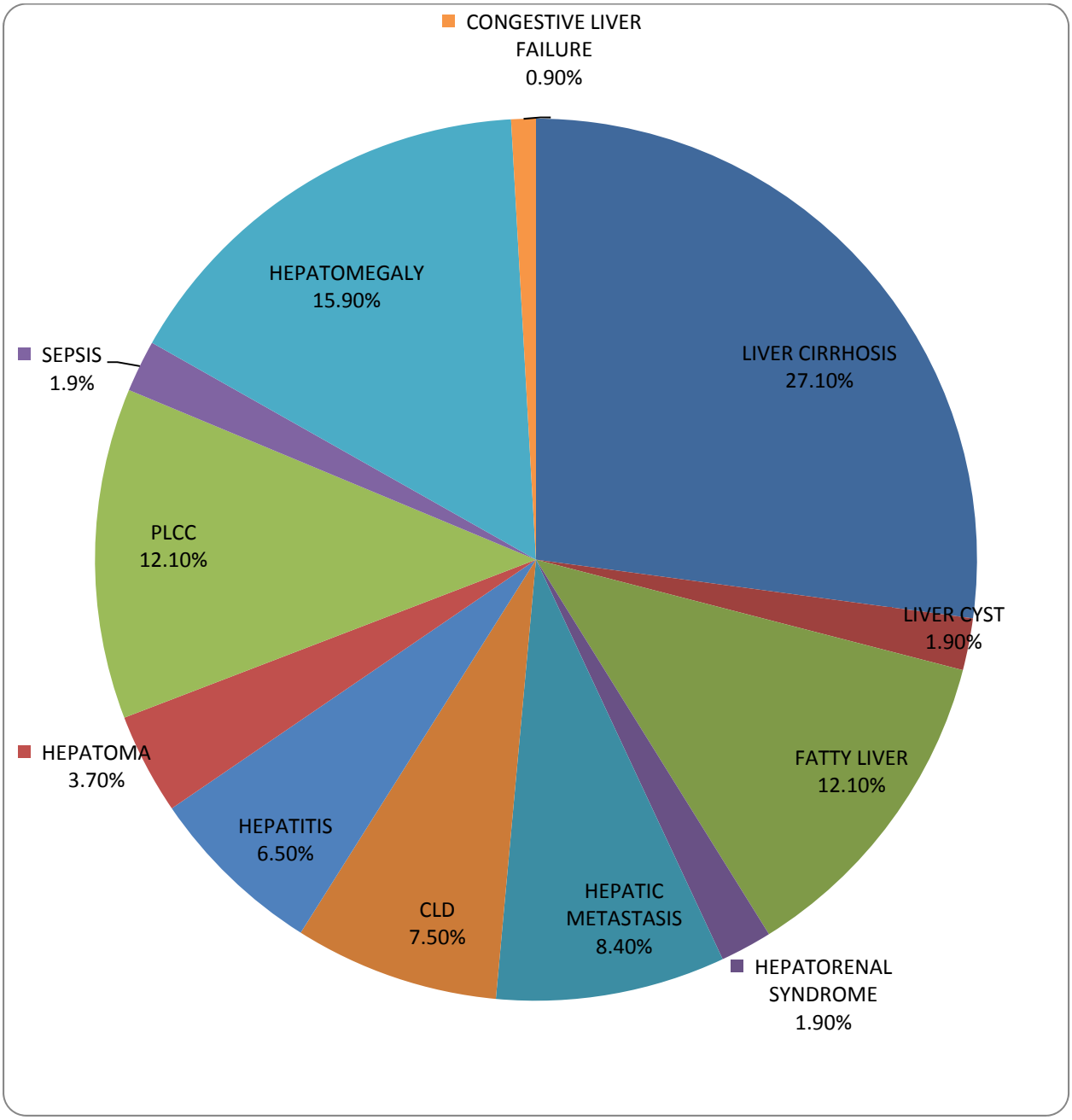

Figure 3.2: A pie chart showing percentage of pathological liver findings

Table 3.5: Gender and age distribution for kidney findings

AGE RANGE (YEARS)	GENDER		FREQUENCY	PERCENTAGE (%)
	M	F		
< 20	18	14	32	19.2
20-29	29	14	43	25.7
30-39	20	7	27	16.2
40-49	11	12	23	13.8
50-59	8	3	11	6.2
60-69	9	3	12	7.2
70-79	9	4	13	7.8
80-89	3	3	6	3.6
TOTAL	**107**	**60**	**167**	**100**

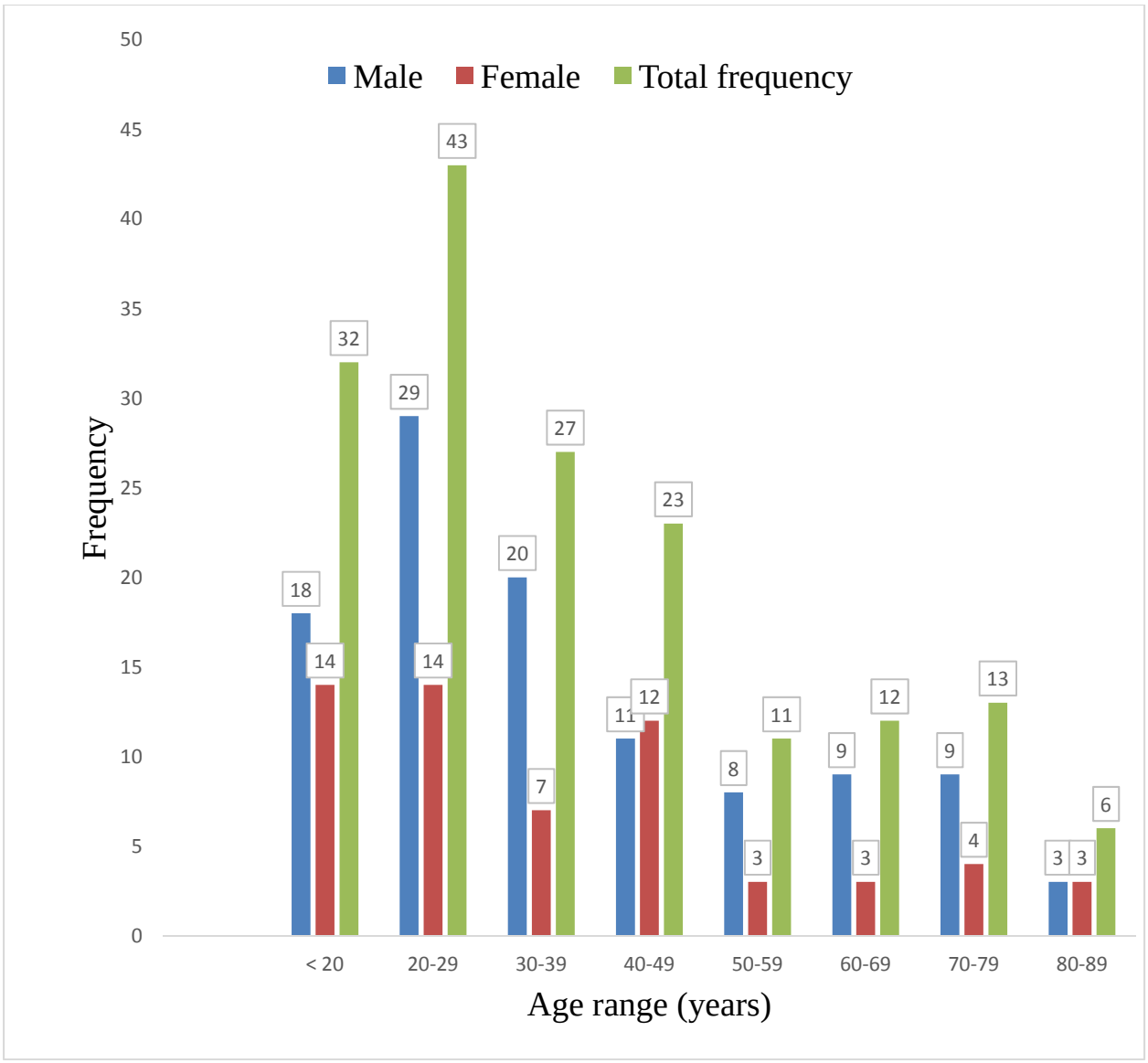

Figure 3.3: A bar chart showing gender and age distribution for pathological kidney findings

Table 3.6: Gender distribution, frequency and percentage of pathological kidney findings

PATHOLOGY	GENDER		FREQUENCY	PERCENTAGE (%)
	M	F		
Pyelonephritis	47	22	69	41.3
Renal parenchyma disease	20	15	35	21.0
Hydronephrosis	16	9	25	15
Renal cyst	6	6	12	7.2
Renal calculi	6	5	11	6.6
Ectopic kidney	3	0	3	1.8
Renal mass	3	0	3	1.8
Renal failure	1	1	2	1.2
Nephrotic syndrome	1	1	2	1.2
Hepatorenal syndrome	1	1	2	1.2
Sepsis	2	0	2	1.2
Renal agenesis	1	0	1	0.6
TOTAL	**107**	**60**	**167**	**100**

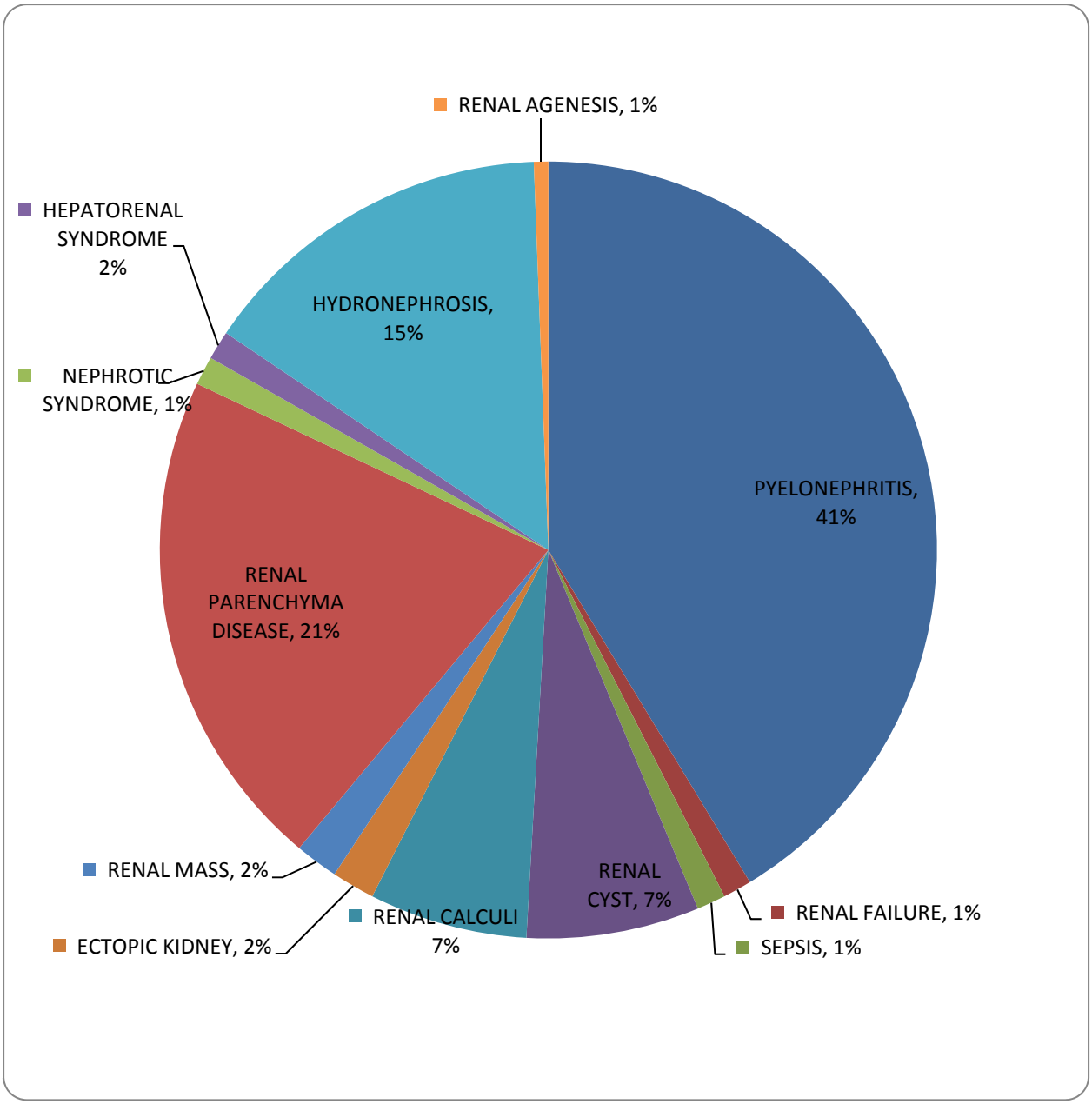

Figure 3.4: A pie chart showing percentage of pathological kidney findings

Discussion

The total of 322 samples were collected and analysed, with a predominant gender of male which carried up to 64.3% of the whole sample, leaving the female gender with the remaining 35.7%. Some patients had findings related to both the liver and kidneys but the predominant requested ultrasound examination and the predominant sonographic findings were those related to the kidneys accounting for up to a frequency of 167 and a percentage of up to 51.9% of all the findings. Liver findings followed with a frequency and percentage of 107 and 33.2 respectively while some had normal sonographic examination (65, 20.2%), in other words; their pathologies were not detected by sonography, though the absence of disease or pathology in them could not be ruled out. The age range of 20-29 years predominated the requests and the findings with a frequency of 63 (19.6%)

After analysing the liver findings, the revealed predominated gender was the male gender with a frequency and percentage of 75 and 70% respectively. This was in lined with a similar study conducted in Asaba, Delta State, Nigeria [8]. The gender distribution of dominant male gender is also in line with that of the study conducted on “Pattern of abnormal sonographic findings in patients with clinical suspicion of chronic liver disease in Sokoto and its environs’’. The study also recorded a dominant male gender of up to 70.5% of the liver pathological findings. A study also recorded a dominant male gender in liver pathology; about 77% of the liver cases were males [9]. The age range of 40-49 years had the highest frequency of 23 (21.5%) and of this age range, there were 16 males (69.6%). This was in contrast with that of Ugwu, A. who recorded 51-60 years as the predominant age range, but was in line with the study conducted by Echejoh in 2008 because the age range fell within the age range of 21-50 which was recorded. The age range that recorded the lowest frequency was 80-89 years with a frequency of 6 (5.6%) [10]. The predominant pathological ultrasonic liver findings that were recorded are Liver Cirrhosis accounting for up to 29 and 27.1% frequency and percentage respectively. Of this frequency for liver cirrhosis, male gender recorded a frequency of 18 (62.1%). This

was followed by Hepatomegaly which recorded a frequency of 17 and a percentage of 15.0%. Fatty liver and Primary liver cell carcinoma (PLCC) had the same frequency and percentage which was 13 (12.1%) each. The findings for the liver are in contrast to similar studies conducted in Asabar, Delta State, Nigeria in which Hepatomegaly was recorded as the most common finding liver pathology, with up to 30.8% of the liver findings, followed by Fatty liver which recorded up to 20.8% of the liver findings [8]. The pathological findings are also in contrast with a study conducted by Nwokediuko *et al*, 2013 who recorded primary liver cell carcinoma (PLCC) and liver cirrhosis as the commonest findings with a percentage of 44.3% and 20.4% respectively.

For the kidneys, the male gender also recorded the highest frequency and percentage which was 107 and 64.1% respectively while female recorded 60 (35.9%). This is in line with the study conducted in Asaba, Delta, Nigeria [7]. The age range that dominated the highest findings ranged from 20-29 years with a frequency and percentage of 43 and 25.7% respectively. Of this age range there were 29 males 67.4%) and 14 females (32.6%). This was followed by the age range of 30-39 years which recorded a frequency of 27 (16.2%). This is in contrast with that of Ugwu, 2014 who recorded a dominant age range of 31-40 years (21.6%) for kidney findings. The age range that recorded the lowest frequency was 80-89 years which had a frequency of 6 (3.6%) which is in lined with the study in Asaba that had 81-90 years with a frequency of 2 only [8].

The pathological finding that dominated the kidney findings after the analysis was Pyelonephritis which had a frequency and percentage of 69 (41.3%). Of the recorded pyelonephritis, male gender was mostly affected, they recorded a frequency of up to 47 (68.1%) while female gender recorded 22 (21.9%). This was followed by renal parenchyma disease (grades I, II, III, or IV) which recorded a frequency and percentage of 35 (21.0%). Hydronephrosis was the third common finding with 25 and 15.0% frequency and percentage respectively. This contrasted the study in Asaba which recorded the following in their order of frequency and percentage; Nephropathy 33 (23.7%), Hydronephrosis 30 (21.6%) and Renal cyst 30 (21.6%).

Conclusion

The study revealed that male gender is at higher risk of having both liver and kidney diseases in Sokoto metropolis than the female and the age of those at higher risk ranged from 20-49 years.

Liver cirrhosis and pyelonephritis are the commonest diseases of the liver and kidneys respectively.

Ethical approval was obtained from the Human Research and Ethics Committee of UDUTH and specialist hospital Sokoto before the study commenced.

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