

## Characterization of Kidney Disease in Adults' Patients Using Ultrasonography

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## Abstract

## Original Research Article

The aim of this study to characterization of kidney disease in adults' patients using ultrasonography, the data of this study was collected from 200 adults' patients both gender suffering from renal disorders and referred to ultrasound department in east coast kalba hospital – Sharjah province United Arab Emirates in period from December 2017 up to July 2018. Classification score matrix generated by linear discriminate analysis and the overall classification accuracy of renal disorders 95.4%, were the classification accuracy of normal 98.6%, HT 94%, and MHT 93.8%, while the DM showed a classification accuracy of 92.9%. Figure 1. Error bar plot shows the BMI of normal patients, hypertensive, mild hypertensive and diabetic patient's. The BMI is low in normal patients while it is high in hypertensive and diabetic patients and moderate in mild hypertensive patients. A diagram shows the depth of the left kidney in normal patients, hypertensive, mild hypertensive and diabetic patients. The depth is medium in normal patients, while it is smaller in hypertensive patients; the depth is bigger in mild hypertensive patients and little less in diabetic patients. The end diastolic velocity of the right kidney in normal patients, hypertensive, mild hypertensive and diabetic patients. In normal patients the end diastolic is low, but lower in mild hypertensive patients; in diabetic patients it is higher than in .mild hypertensive patients, but less high than in hypertensive patients. It is very low in normal patients, high in hypertensive and mild hypertensive patients and little less in diabetic patients.

**Keywords:** kidney disease, hypertensive, diabetic, Ultrasonography.

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## INTRODUCTION

Ultrasound is a technique commonly used to evaluate the structure of the kidney and urinary Collecting systems [1, 2]. Serial sonographic measurements of renal length are often used to evaluate whether the kidneys are growing appropriately; lack of normal renal growth raises the suspicion that the kidney may be undergoing chronic or repeated insults, such as from vesicoureteral reflux or pyelonephritis [3-5]. Although ultrasound has an advantage over other imaging techniques in that it uses no ionizing radiation and does not require sedation, its accuracy in evaluating renal length for the purposes of determining appropriate renal growth is limited. Ultrasound measurement of renal length is frequently used as an indicator of the chronicity of renal disease, with avajue of 9 cm or less considered to indicate Irreversible disease [6]. It is also an important factor in the decision to undertake renal biopsy, as knowledge of the histology of shrunken kidneys in chronic renal failure is frequently UN helpful in subsequent treatment and the Complication rate following biopsy is increased in shrunken kidneys [7]. It

is therefore important that Sonographic renal length measurements are consistent, both for replicate measurements by a single ultra-sonographer and by different ultra-sonographers.

### Screening indications

Multiple guidelines recommend that patients with diabetes or hypertension be screened annually for CKD. Furthermore, patients with other risk factors, including cardiovascular disease, older age, history of low birth weight, obesity, and a family history of CKD, warrant Consideration for screening [8-10]. The U.S. Preventive Services Task Force concluded that the evidence is insufficient to assess the balance of benefits and harms of routine screening for CKD in asymptomatic adults [11]. The American College of Physicians and the American Academy of Family Physicians recommend against screening for CKD in asymptomatic adults without risk factors [12, 13].

### Screening tests

Screening for CKD includes measurement of serum creatinine, estimation of GFR using a serum creatinine-based equation, measurement of the urine albumin/creatinine ratio, and urinalysis [8]. Urinalysis has a high sensitivity for heavy proteinuria (greater than 300 mg per 24 hours, as estimated from the spot urine protein/creatinine ratio) but may not detect clinically significant lower levels (30 to 300 mg) [14]. Because albumin is the predominantly filtered glomerular protein, initial proteinuria evaluation using the spot urine albumin/creatinine ratio obtained from an early morning sample is recommended [8, 15, 16]. Timed 24-hour urine collections are no longer recommended as an initial diagnostic tool because of the potential for inadequate collection, inconvenience to patients, and the lack of diagnostic advantage over the urine albumin/creatinine ratio.

## METHODOLOGY

The data of this study was collected from 200 adults' patients both gender suffering from renal disorders and referred to ultrasound department in east coast kalba hospital – Sharjah province United Arab Emirates in period from December 2017 up to July 2018.

Tools and equipment's: Ultrasound system general electric GE. Transducer: highest frequency curved linear array probe possible, start with 5 MHZ and work down to 2 or 3 MHZ for larger patients with color and doppler capabilities. A high sweep speed will improve accuracy of the measurements taken to the spectral trace.

The patient's variables were age, gender, kidney volume and resistance index of the right and left kidneys.

### Scanning technique

The patient should be lie supine, for the right kidney have the patient lie supine and place the probe in the right lower intercostal space in the mid axillary line. And the liver as your acoustic window and aim the probe slightly posteriorly toward the kidney. Gently rock the probe up and down or side to side to scan the interior kidney. Obtain longitudinal (long axis) and transverse (short axis) views.

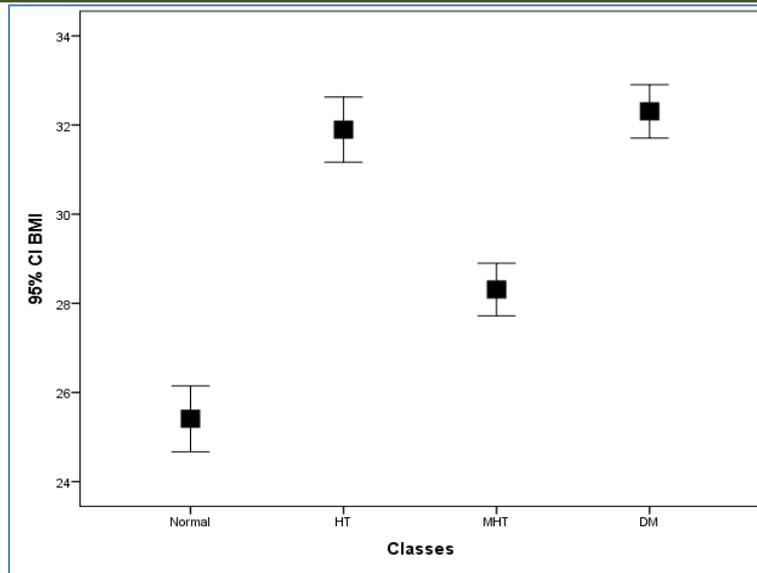
For the left kidney the patient has lie supine or in the right lateral decubiti position, place the prob in the lower intercostal space on the posterior axial line. The placement will be more cepement and posterior than when visualizing right kidney, and again rock the probe to scan the entire kidney to obtain longitudinal and transverse view.

Assessing the arteries within the kidney parenchyma to assess any alteration in the waveforms. The RI should be low resistance. The acceleration time (AT) should be < 70 msec. the probe is slowly moved superior and inferior to search for additional renal arteries. Any vessels identified must be traced to the kidney and confirm their identity. The kidneys will be atrophy with chronic renal failure and the length should be <9 cm, the RI > 0.8 cm for untreatable medical renal disease.

## RESULTS

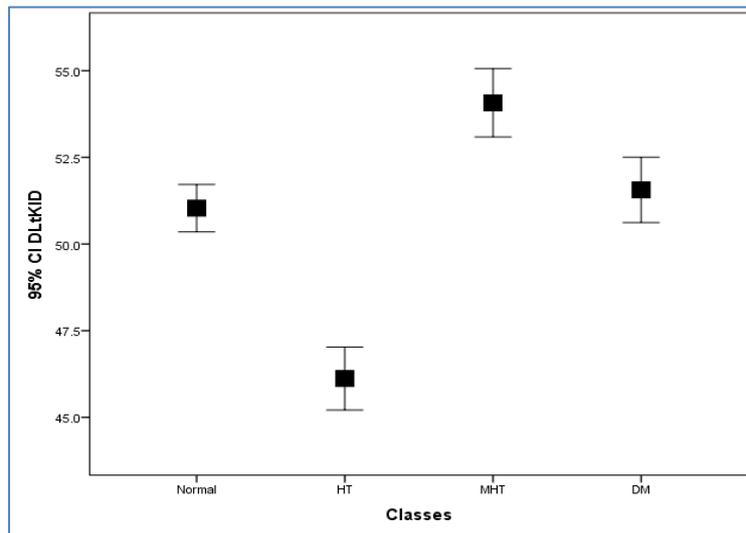
**Table-1: Showed the classification accuracy of the Predicted Group Membership for the four classes using linear discriminant analysis**

Classes		Predicted Group Membership				Total
		Normal	HT	MHT	DM	
%	Normal	98.6	.7	0.0	.7	100.0
	HT	4.5	94.0	0.0	1.5	100.0
	MHT	6.2	0.0	93.8	0.0	100.0
	DM	4.1	2.0	1.0	92.9	100.0
95.4% of original grouped cases correctly classified.						

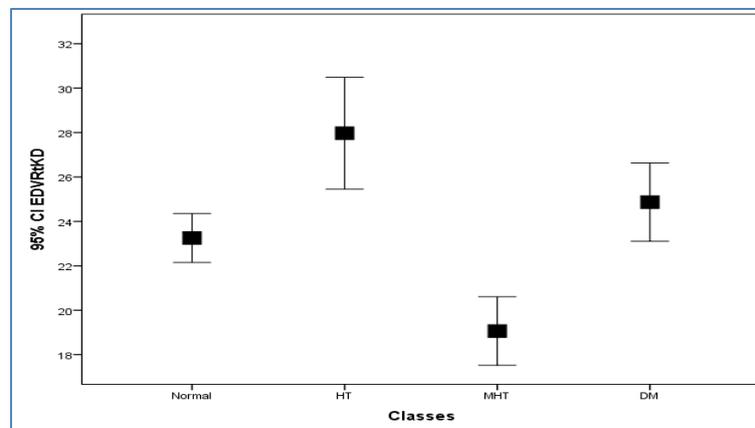


**Fig-1:** Error bar plot shows the BMI of normal patients, hypertensive, mild hypertensive and diabetic patients. The BMI is low in normal patients while it is high in hypertensive and diabetic patients and moderate in mild hypertensive patients.

**TTFF**



**Fig-2:** This diagram shows the depth of the left kidney in normal patients, hypertensive, mild hypertensive and diabetic patients. The depth is medium in normal patients, while it is smaller in hypertensive patients; the depth is bigger in mild hypertensive patients and little less in diabetic patients,



**Fig-3:** Shows the end diastolic velocity of the right kidney in normal patients, hypertensive, mild hypertensive and diabetic patients. In normal patients the end diastolic is low, but lower in mild hypertensive patients; in diabetic patients it is higher than in .mild hypertensive patients, but less high than in hypertensive patients

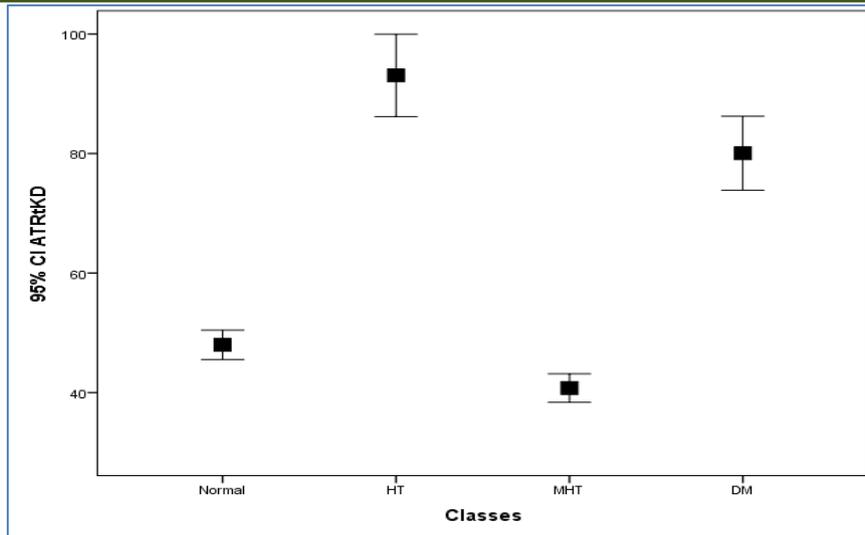


Fig-4: This figure shows the acceleration time of the rt kidney, which is low in normal patients, lower in mild hypertensive patients, while it is higher in hypertensive patients and little less in diabetic ones

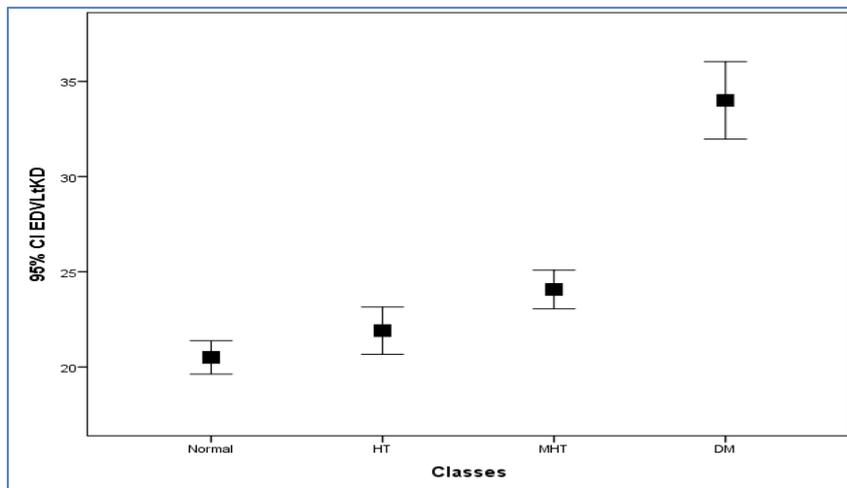


Fig-5: shows the end diastolic velocity of the left kidney in normal patients, hypertensive, mild hypertensive and diabetic patients. it is found to be high in diabetic patients, while it is very low in normal patients, a little bit more in hypertensive patients, and one more grad higher in mild hypertensive patients

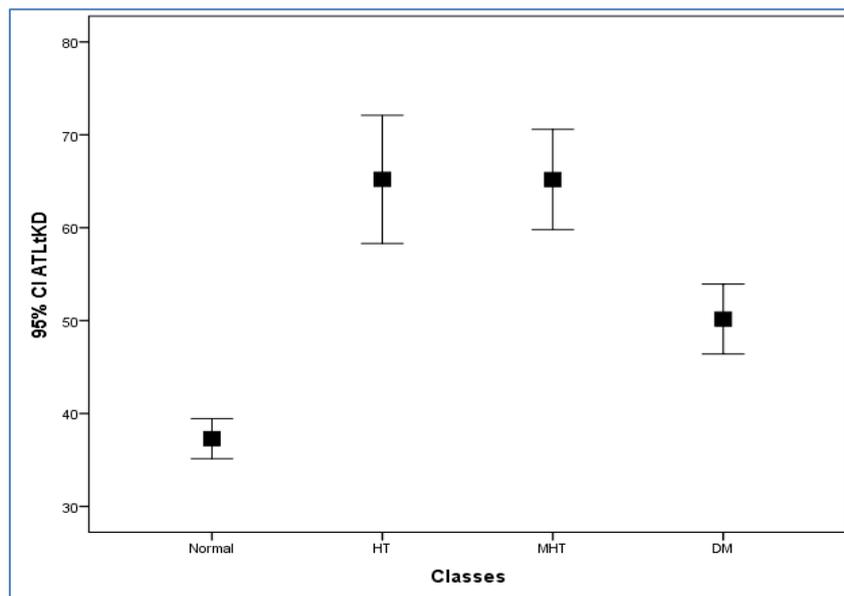


Fig-6: Shows the acceleration time of the left kidney in normal patients, hypertensive, mild hypertensive and diabetic ones

## DISCUSSIONS

Table 1. Show classification score matrix generated by linear discriminate analysis and the overall classification accuracy of renal disorders 95.4%, were the classification accuracy of normal 98.6%, HT 94%, and MHT 93.8%, while the DM showed a classification accuracy of 92.9%.

Figure 1. Error bar plot shows the BMI of normal patients, hypertensive, mild hypertensive and diabetic patient's. The BMI is low in normal patients while it is high in hypertensive and diabetic patients and moderate in mild hypertensive patients.

Figure 2. This diagram shows the depth of the left kidney in normal patients, hypertensive, mild hypertensive and diabetic patients. The depth is medium in normal patients, while it is smaller in hypertensive patients; the depth is bigger in mild hypertensive patients and little less in diabetic patients,

Figure 3. Shows the end diastolic velocity of the right kidney in normal patients, hypertensive, mild hypertensive and diabetic patients. In normal patients the end diastolic is low, but lower in mild hypertensive patients, in diabetic patients it is higher than in .mild hypertensive patients, but less high than in hypertensive patients.

Figure 4. This figure shows the acceleration time of the rt kidney, which is low in normal patients, lower in mild hypertensive patients, while it is higher in hypertensive patients and little less in diabetic ones.

Figure 5. shows the end diastolic velocity of the left kidney in normal patients, hypertensive, mild hypertensive and diabetic patients. it is found to be high in diabetic patients, while it is very low in normal patents, a little bit more in hypertensive patients, and one more grad higher in mild hypertensive patients.

Figure 6. Shows the acceleration time of the left kidney in normal patients, hypertensive, mild hypertensive and diabetic ones.

It is very low in normal patients, high in hypertensive and mild hypertensive patients and little less in diabetic patients.

## CONCLUSION

Characterization of kidney disease in adults' patients using ultrasonography, the data of this study was collected from 200 adults' patients both gender suffering from renal.

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