
Ultrasonographic Evaluation of Renal Parenchyma in Bangladesh: A Comparative Study

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Abstract: *Background:* Renal ultrasonography is often the most applicable and beneficial radiologic technique for evaluating hypertensive patients. For the evaluation of the effects of hypertension on the kidneys and their function, it is necessary to develop a method that is both safe and reasonable. *Objective:* The objective of this study was to compare renal sonographic parameter in hypertensives and normotensive patients. *Methods:* This case control study was carried out to find out the renal sonographic parameters in hypertensive and normotensive patients. The sample size was 135 in each group (Hypertensive and normotensive) which was selected purposively. *Results:* Most (37.04%) of the respondents were in 41-50 years age among them 52.0% were female in case group and 49.63% were <40 years among them 60.0% were female in control group. In case group 52.6% were from urban area, 33.3% were graduates, 40.7% were housewives, 51.11% had >26 BMI. In control group 50.4% were from urban area, 33.3% had secondary level of education, 48.9% were housewives and 84.44% had 22-26 BMI. Regarding serum creatinine level in case group it was found that 87.41% had 0.74-1.35 mg/dL creatinine, in control group it was found that 63.70% had 0.74-1.35 mg/dL. Renal bipolar length, renal anterior posterior diameter, renal cortical thickness, renal cortical ecogeneity, corticomedullary differentiation were significantly associated with their TC and TAG in both hypertensive and non-hypertensive group. *Conclusion:* So this study aimed to identify the parameters that indicate increase risk of possible renal damage in individuals with essential hypertension.

Keywords: Renal Parameters, Hypertensive Patients, Bangladesh

1. Introduction

Hypertension is a noncommunicable, chronic, multisystemic disease that affects other organs in addition to the kidneys. In such case, the systolic blood pressure is measured to be exceeded 140 mmHg or the diastolic exceeds 90 mmHg or the both happens [1]. Next to stroke and congestive cardiac failure, the third highest complications are the renal related ones [2]. In order to assess the size of kidney, the most commonly and effortlessly reproducible parameter is the renal length. Disease conditions like hypertension are being more affected by other

renal parameters. Patients having chronic renal disease minor to hypertension have shown to decrease renal cortical thickness [3]. Renal function assesses and finds correlating with renal parenchymal thickness [4]. In South-East Nigeria, a study was conducted earlier by Okoye [5] using ultrasound and found that the individuals aging between 18 and 80 years are having correlation between that renal parenchymal thickness with the renal length on ultrasound. Similarly, another study was conducted in the United States by Cost [4] where they found more perfect estimation of renal size and function while measuring renal parenchymal area on ultrasound.

Comparatively smaller renal cortical volume and more heterogeneous renal cortex were found in a study conducted out in Japan [6]. It has been reviewed thoroughly and has come up with a guideline for the diagnosis and when to start treatment for hypertension. The review found that the treatment could be started where the sustained elevation of systolic blood pressure will have a range of ≥ 140 mmHg or diastolic blood pressure having a range of ≥ 90 mmHg [7]. Hypertension is considered as a major risk factor despite the fundamental role played by the kidneys in the control of high blood pressure for renal injury and end-stage irretrievable renal impairment by persuading myointimal hyperplasia of the intrarenal arteries [8]. Intervention of early treatment through early detection using ultrasonography to find out the effects on the kidneys like the renovascular changes can prevent or delay irreversible renal damage. Moreover, on end stage kidneys, this can offer prognostic information being one of the ultrasonic renal parameters [9]. A required imaging method is the Ultrasonography which is easy to perform and evaluate the morphological changes of the kidneys. It also does not bear any biological effects. Urology defined Ultrasonography as a frequently leading optimal final diagnosis which the presence of renal cysts, cortico-medullary differentiation (CMD) and measuring the renal length [10].

There should be a harmless and reasonable method which is required to be established for the assessments of the effects of hypertension on the kidneys and their function. Advantages like permitting of serial monitoring and patients' follow-up are offered by ultrasound. This study was aimed at identifying the parameters which may specify amplified risk of conceivable renal damage in individuals with essential hypertension and to make a comparison of renal sonographic parameter between hypertensives and normotensive patients.

2. Methods

This case control type of observational study was for the time being from January 2018 to December 2020. During the study period, the study population consisted of all hypertension and normotensive patients of both sexes attending the Institute of Nuclear Medicine and Allied Sciences (INMAS), Rangpur, Bangladesh and Hypertension and Research Center, Rangpur, Bangladesh. After calculating the sample size, the sample considered 135 in case group & 135 in control group. Purposive sampling technique was used in this study.

2.1. Inclusion Criteria

Hypertensive and normotensive patients attended in the study institutes aged 18 years and above. Patients with serum creatinine levels of less than 2 mg/dL. Patient with hypertension and other co-morbid disorders that do not damage the kidneys.

2.2. Exclusion Criteria

Patients with known renal disease, Diabetes mellitus, liver

disease and haemoglobinopathies were excluded from the study. Patients with obvious sonographic renal anomalies eg. polycystic kidney disease, renal tumour and Hydronephrosis were also excluded. Patients unwilling to participate in the study.

Statistical analysis was carried out using SPSS software (IBM, version 21.0).

3. Results

Regarding age group of the respondents it was revealed that in case group 37.04% were in the age group of 41-50 years, 25.19% were in the 51-60 years age group, 22.96% were more than 60 years age group and 14.81% in <40 years age group. About 49.63% in the <40 years age group, 29.63% were 41-50 years age group, 15.56% were in the age group of 51-60 years and 5.19% were in the age group of >60 years in control group (Figure 1). It was discovered that around 52% of the respondents were female and 48.0% were male in case group and 60.0% were female and 40.0% were male in control group (Figure 2). It was showing that among the case group 33.3% were graduates, 25.9% had secondary level of education, 20.0% had primary education, 18.5% had higher secondary education and 2.2% were illiterate. In control group 33.3% had secondary level of education, 22.2% had higher secondary level of education, 21.5% were graduates, 20.0% had primary level of education and 3.0% were illiterate (Figure 3). It was exposed that most of the respondents (40.7%) were housewives, 28.1% were in service, 11.1% were in agricultural business, 9.6% were business men, 8.1% were retired service holder and 2.2% were unemployed in case group. In control group 48.9% were housewife, 20.0% were in service, 10.4% in agricultural business, 8.9% in others profession and 2.2% were unemployed (Figure 4).

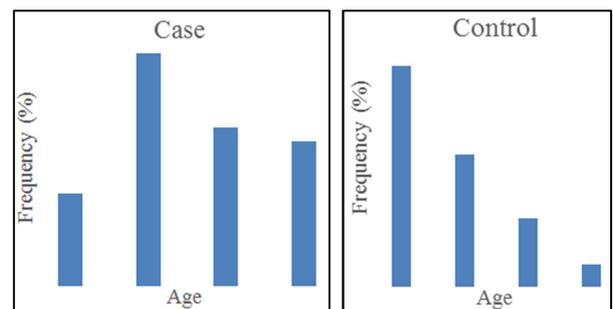


Figure 1. Age group of the respondents.

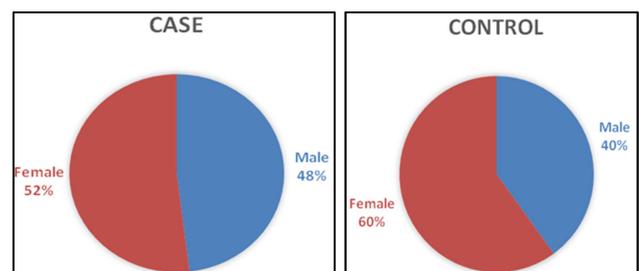


Figure 2. Sex of the respondents.

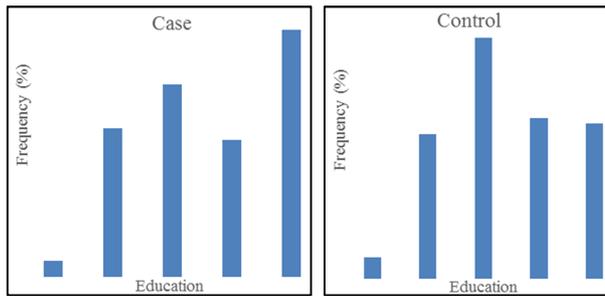


Figure 3. Education of the respondents.

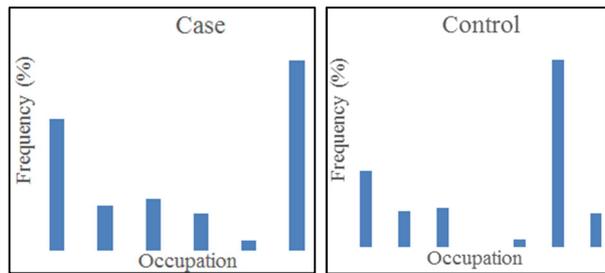


Figure 4. Occupation of the respondents.

It was revealed that among the case group 52.6% were from urban area and 47.4% were from rural area. In control group 50.4% were from urban area and 49.6% were from rural area. It was found that 51.11% of the respondents had >26 BMI, 39.26% had 22-26 BMI and 9.63% had <22 BMI in case group. In control group 84.44% had 22-26 BMI and 15.56% had <22 BMI. Regarding pulse it was found that 58.52% of the respondents had 70-80 beats/min pulse, 22.22% had <70 beats/min and 19.26% had >80 beats/min in case group. In control group it was revealed that 60.0% had 70-80 beats/min pulse, 31.11% had <70 beats/min and 8.89% had >80 beats/min pulse. In case group majority (52.59%) of the respondents had 120-140/80-90 mm of Hg of blood pressure, 34.81% had >140/90 mm of Hg and 12.59% had <120/80 mm of Hg. In control group 57.04% had <120/80 mm of Hg, 42.96% had 120-140/80-90 mm of Hg of blood pressure. Regarding smoking status in case groups it was found that 73.3% of the respondents did not have history of smoking and 26.7% had the history. In control group 72.6% did not have the smoking history and 27.4% had the history. About 75.56% of the case group had <10 years of HTN, 22.22% had 10-20 years of HTN and 2.22% had >20 years of HTN. Regarding taking anti hypertensive drug it was found that among the case group 100.0% took anti hypertensive drug. Regarding hypertensive status with drug it was found that 80.7% had control HTN with their drugs and 19.3% found uncontrolled HTN in case group. Regarding serum

creatinine level in case group it was found that 87.41% had 0.74-1.35 mg/dL creatinine, 11.85% had >1.35 mg/dL and 0.74% had <0.74 mg/dL. In control group it was found that 63.70% had 0.74-1.35 mg/dL and 36.30% had <0.74 mg/dL of creatinine. Regarding urinary albumin in case group it was revealed that 51.9% had trace albumin, 39.3% did not found albumin, 5.9% had mild and 3.0% had moderate albumin. In control group 95.6% did not found any albumin, 3.7% had trace and 0.7% had mild albumin. Regarding renal bipolar length in case group 73.33% found 8-10 cm, 21.48% found >10 cm and 5.19% found <8 cm in right kidney and 60.0% found 8-10 cm, 37.04% found >10 cm and 2.96% found <8 cm in left kidney. In control group 70.37% found 8-10 cm, 28.15% found >10 cm and 1.48% found <8 cm in right kidney and 56.3% found 8-10 cm and 43.7% found >10 cm in left kidney. In case group renal anterior posterior diameter was found 51.85% had 2-4 cm, 47.41% had >4cm and 0.74% had <2cm in right kidney and 51.85% had >4 cm and 48.15% had 2-4 cm in left kidney. In control group 69.63% found 2-4 cm, 29.63% found >4 cm and 0.74% found <2 cm in right kidney and 63.7% found 2-4 cm and 36.3% found >4 cm in left kidney. Regarding renal cortical thickness in case group it was found that 89.63% found 0.5-1 cm, 6.67% found <0.5cm and 3.70% found >1 cm in right kidney and 85.19% found 0.5-1 cm, 9.63% found >1 cm and 5.19% found <0.5 cm in left kidney. In control group 53.33% found 0.5-1 cm, 46.67% found >1 cm in right kidney and 64.44% found >1 cm, 34.07% found 0.5-1 cm and 1.48% found <0.5 cm in left kidney. Regarding renal cortical echogenicity in case group it was revealed that 74.8% found grade 0, 14.1% found grade 1, 9.6% found grade 2 and 1.5% found grade 3 in right kidney and 74.1%, 15.6%, 8.9% and 1.5% found grade 0, 1, 2 and 3 respectively in left kidney. In control group it was found that 97.2%, 2.2% and 0.7% found grade 0, 1 and 2 respectively in right kidney and 97.0%, 2.2% and 0.7% found grade 0, 1 and 2 respectively in left kidney. Regarding corticomedullary differentiation 84.4% found normal, 14.1% found partial loss and 1.5% found complete loss in right kidney and 84.4% found normal, 14.1% found partial loss and 1.5% found complete loss in left kidney. Regarding TC in case group it was found that 69.63%, 17.04% and 13.33% had 150-199 mg/dL, >199 mg/dL and <150 mg/dL respectively. In control group TC was found in 85.93%, 11.1% and 2.96% in 150-199 mg/dL, <150 mg/dL and >199 mg/dL respectively. In case group TAG was found 72.59% and 27.41% in 40-160 mg/dL and >160 mg/dL respectively. In control group it was found 95.56% and 4.44% in 40-160 mg/dL and >160 mg/dL respectively (Table 1).

Table 1. Association between renal findings, lipid profile and their socio-demographic factors.

Different conditions related with HTN	Case		Control	
	Number	Frequency (%)	Number	Frequency (%)
Residence				
Urban	71	52.6	68	50.4
Rural	64	47.4	67	49.6
BMI				
<22	13	9.63	21	15.56

Different conditions related with HTN	Case		Control	
	Number	Frequency (%)	Number	Frequency (%)
22-26	53	39.26	114	84.44
>26	69	51.11	0	0.00
Pulse				
<70 beats/min	30	22.22	42	31.11
70-80 beats/min	79	58.52	81	60.00
>80 beats/min	26	19.26	12	8.89
Blood pressure				
<120/80 mm of Hg	17	12.59	77	57.04
120-140/80-90 mm of Hg	71	52.59	58	42.96
>140/90 mm of Hg	47	34.81	0	0.00
Smoking status				
Yes	36	26.7	37	27.4
No	99	73.3	98	72.6
Duration of hypertension in years				
<10	102	75.56	-	-
10-20	30	22.22	-	-
>20	3	2.22	-	-
Taking anti hypertensive drug				
Yes	135	100.0	-	-
No	0	0	-	-
Hypertensive status with drug				
Controlled	109	80.7	-	-
Uncontrolled	26	19.3	-	-
Serum creatinine				
< 0.74 mg/dL	1	0.74	49	36.30
0.74-1.35 mg/dL	118	87.41	86	63.70
>1.35 mg/dL	16	11.85	0	0.00
Urinary albumin				
Nil	53	39.3	129	95.6
Trace	70	51.9	5	3.7
Mild	8	5.9	1	0.7
Moderate	4	3.0		
Renal bipolar length (Right)				
<8 cm	7	5.19	2	1.48
8-10 cm	99	73.33	95	70.37
>10 cm	29	21.48	38	28.15
Renal bipolar length (Left)				
<8 cm	4	2.96	0	0.00
8-10 cm	81	60.00	76	56.30
>10 cm	50	37.04	59	43.70
Renal anterior-posterior diameter (R)				
<2 cm	1	0.74	1	0.74
2-4 cm	70	51.85	94	69.63
>4 cm	64	47.41	40	29.63
Renal anterior-posterior diameter (L)				
<2 cm	0	0.00	0	0.00
2-4 cm	65	48.15	86	63.70
>4 cm	70	51.85	49	36.30
Renal cortical thickness (R)				
<0.5 cm	9	6.67	0	0.00
0.5-1 cm	121	89.63	72	53.33
>1 cm	5	3.70	63	46.67
Renal cortical thickness (L)				
<0.5 cm	7	5.19	2	1.48
0.5-1 cm	115	85.19	46	34.07
>1 cm	13	9.63	87	64.44
Right renal cortical echogenicity				
Grade 0	101	74.8	131	97.0
Grade 1	19	14.1	3	2.2
Grade 2	13	9.6	1	.7
Grade 3	2	1.5	0	0
Left renal cortical echogenicity				
Grade 0	100	74.1	131	97.0
Grade 1	21	15.6	3	2.2
Grade 2	12	8.9	1	.7
Grade 3	2	1.5	0	0

Different conditions related with HTN	Case		Control	
	Number	Frequency (%)	Number	Frequency (%)
Right corticomedullary differentiation				
Normal	114	84.4	135	100.0
Partial loss	19	14.1		
Complete loss	2	1.5		
Left corticomedullary differentiation				
Normal	114	84.4	135	100.0
Partial loss	19	14.1		
Complete loss	2	1.5		
TC				
<150 mg/dL	18	13.33	15	11.11
150-199 mg/dL	94	69.63	116	85.93
>199 mg/dL	23	17.04	4	2.96
TAG				
<40 mg/dL	0	0.00	0	0.00
40-160 mg/dL	98	72.59	129	95.56
>160 mg/dL	37	27.41	6	4.44

4. Discussion

The purpose of this case-control study was to compare renal sonographic parameters between hypertensive and normotensive patients. The sample size for each group (hypertensive and normotensive) was 135 individuals who were purposefully selected. Face-to-face interviews were performed to obtain data from respondents using a semi-structured questionnaire. Every effort was made to acquire correct data. For open-ended questions, respondents were asked in such a way that they may freely express their views and do so in a natural and impartial manner. Regarding the age group of the respondents, it was determined that in the case group 37.04% were in the age group of 41-50 years, 25.19% were in the age group of 51-60 years, 22.96% were in the age group of more than 60 years, and 14.80% were in the age group of 40 years. In the control group, about 49.63% were in the 40 years age group, 29.63% were in the 41-50 years age group, 15.566% were in the 51-60 years age group, and 5.19 % were in the >60 years age group (Figure 1). In another study, the participants were classified in range of a mean (\pm SD) of 44 (\pm 17) years from 16 – 80 [11]. It was discovered that around 52% of the respondents were female and 48.0% were male in case group and 60.0% were female and 40.0% were male in control group (Figure 2). The study took place in correspondence of 74 males and 71 females resulting in a total of 145 adults. 85 hypertensive outpatients were comprised by them among them 40 were males and 45 females. In contrast, the non-hypertensive control group consisted of 60 individuals, 34 male and 26 female [11]. It was revealed that among the case group 52.6% were from urban area and 47.4% were from rural area. In control group 50.4% were from urban area and 49.6% were from rural area. It was showing that among the case group 33.3% were graduates, 25.9% had secondary level of education, 20.0% had primary education, 18.5% had higher secondary education and 2.2% were illiterate. In control group 33.3% had secondary level of education, 22.2% had higher secondary level of education, 21.5% were graduates, 20.0% had primary level of education and 3.0% were illiterate

(Figure 3). It was exposed that most of the respondents (40.7%) were housewives, 28.1% were in service, 11.1% were in agricultural business, 9.6% were business men, 8.1% were retired service holder and 2.2% were unemployed in case group. In control group 48.9% were housewife, 20.0% were in service, 10.4% in agricultural business, 8.9% in others profession and 2.2% were unemployed (Figure 4). It was originated that 51.11% of the respondents had >26 BMI, 39.26% had 22-26 BMI and 9.63% had <22 BMI in case group. In control group 84.44% had 22-26 BMI and 15.56% had <22 BMI (Table 1). Height, weight, and body mass index (BMI) are the anthropometric estimations shown by different studies exceptionally related well with renal length and volume [12, 13]. There are some non-communicable diseases like, diabetes mellitus and hypertension which may lead to end-stage renal disease (ESRD) unless they are properly treated caused by higher BMI associated with increased risk of diseases [14]. The mean BMI was 22.3 kg/m² where the range is 14.4 – 37.3 and BSA was 1.65 m² where the range is 1.25 – 2.09 [11]. As regards pulse it was found that 58.52% of the respondents had 70-80 beats/min pulse, 22.22% had <70 beats/min and 19.26% had >80 beats/min in case group. In control group it was revealed that 60.0% had 70-80 beats/min pulse, 31.11% had <70 beats/min and 8.89% had >80 beats/min pulse. In case group majority (52.59%) of the respondents had 120-140/80-90 mm of Hg of blood pressure, 34.81% had >140/90 mm of Hg and 12.59% had <120/80 mm of Hg. In control group 57.04% had <120/80 mm of Hg, 42.96% had 120-140/80-90 mm of Hg of blood pressure. Regarding smoking status in case groups it was found that 73.3% of the respondents did not have history of smoking and 26.7% had the history. In control group 72.6% did not have the smoking history and 27.4% had the history. About 75.56% of the case group had <10 years of HTN, 22.22% had 10-20 years of HTN and 2.22% had >20 years of HTN. The mean duration of self-reported duration of hypertension is 7 where the diagnosis ranged from 1 to 24 completed years [11]. Regarding taking anti hypertensive drug it was found that among the case group 100.0% took anti hypertensive drug. Regarding hypertensive status with drug it was found that 80.7% had control HTN with their

drugs and 19.3% found uncontrolled HTN in case group. A multifactorial non-communicable syndrome defined as obstinately elevated blood pressure (BP) which significantly contributes to the worldwide burden of diseases is known as Hypertension. For several illnesses including renal failure, cardiovascular diseases [15] and premature death worldwide [16] hypertension is a well-known variable risk factor. Regarding serum creatinine level in case group it was found that 87.41% had 0.74-1.35 mg/dL creatinine, 11.85% had >1.35 mg/dL and 0.74% had <0.74 mg/dL. In control group it was found that 63.70% had 0.74-1.35 mg/dL and 36.30% had <0.74 mg/dL of creatinine. In this study among the hypertensive group, Serum creatinine values were suggestively higher notwithstanding the fact of the hypertensive patients with stable blood pressure control were already on therapy. In order to underlying hypertension-induced renal damage, this may be a pointer in the individuals [11]. Concerning urinary albumin in case group it was revealed that 51.9% had trace albumin, 39.3% did not found albumin, 5.9% had mild and 3.0% had moderate albumin. In control group 95.6% did not found any albumin, 3.7% had trace and 0.7% had mild albumin. Pertaining to renal bipolar length in case group 73.33% found 8-10 cm, 21.48% found >10 cm and 5.19% found <8 cm in right kidney and 60.0% found 8-10 cm, 37.04% found >10 cm and 2.96% found <8 cm in left kidney. In control group 70.37% found 8-10 cm, 28.15% found >10 cm and 1.48% found <8 cm in right kidney and 56.3% found 8-10 cm and 43.7% found >10 cm in left kidney. By means of a report from Turkey, this finding is considered to be in agreement and it also reported the reduction of renal volume in hypertensive patients compared to the non-hypertensive controls [17]. In case group renal anterior posterior diameter was found 51.85% had 2-4 cm, 47.41% had >4cm and 0.74% had <2cm in right kidney and 51.85% had >4 cm and 48.15% had 2-4 cm in left kidney. In control group 69.63% found 2-4 cm, 29.63% found >4 cm and 0.74% found <2 cm in right kidney and 63.7% found 2-4 cm and 36.3% found >4 cm in left kidney. Regarding the renal size, the RRV ranged from 36.1 – 201.6 cm³ with a mean of 99.1 while LRV ranged from 35.8 – 253.7 cm³ with a mean of 107.4 [21]. Regarding renal cortical thickness in case group it was found that 89.63% found 0.5-1 cm, 6.67% found <0.5cm and 3.70% found >1 cm in right kidney and 85.19% found 0.5-1 cm, 9.63% found >1 cm and 5.19% found <0.5 cm in left kidney. In control group 53.33% found 0.5-1 cm, 46.67% found >1 cm in right kidney and 64.44% found >1 cm, 34.07% found 0.5-1 cm and 1.48% found <0.5 cm in left kidney. Mounier-Vehier in France also studied renal cortical thickness among other renal parameters in hypertensives with unilateral renal artery stenosis and found significant cortical atrophy in the kidneys with stenosed renal arteries [18]. Buchholz in Karachi Pakistan found the left renal cortical thickness to be higher than the right in their study [19]. Kojima in Japan documented decreased cortical tissue and increased heterogeneity in patients with essential hypertension compared with age-matched normotensives in their study

using CT to be due to early involvement of the renal cortex in hypertension which seems to affect the renal cortex more than the renal medulla [6]. Regarding renal cortical echogenicity in case group it was revealed that 74.8% found grade 0, 14.1% found grade 1, 9.6% found grade 2 and 1.5% found grade 3 in right kidney and 74.1%, 15.6%, 8.9% and 1.5% found grade 0, 1, 2 and 3 respectively in left kidney. In control group it was found that 97.2%, 2.2% and 0.7% found grade 0, 1 and 2 respectively in right kidney and 97.0%, 2.2% and 0.7% found grade 0, 1 and 2 respectively in left kidney. The controls in the study were lower than the cortical echogenicity in the hypertensives. The variance in cortical echogenicity between the two groups was statistically significant for both kidneys which is $P = 0.0001$. In patients with chronic kidney disease, the increased cortical echogenicity on ultrasound was recorded by Siddappa [20]. Though it is not a specific sign, the increase of cortical echogenicity has been recognized as a indicator to renal parenchymal disease in several studies. Increased cortical echogenicity on ultrasound was found in a study by Araujo in numerous disease conditions which was reported as the increase in cortical echogenicity progressed since the worsened condition of the disease [21]. Regarding corticomedullary differentiation 84.4% found normal, 14.1% found partial loss and 1.5% found complete loss in right kidney and 84.4% found normal, 14.1% found partial loss and 1.5% found complete loss in left kidney. Reasonably, because of the study population in the concluding study comprised of individuals with chronic renal failure (CRF), these values were higher than those found in the study by Beland in Rhode Island [3]. Similar to this, in India Siddappa also measured cortical thickness in adults with CRF. Even if their values were higher than those found by Beland they also conveyed that cortical thickness reduced with enlarged cortical echogenicity in their individuals [3, 20]. Regarding TC in case group it was found that 69.63%, 17.04% and 13.33% had 150-199 mg/dL, >199 mg/dL and <150 mg/dL respectively. In control group TC was found in 85.93%, 11.1% and 2.96% in 150-199 mg/dL, <150 mg/dL and >199 mg/dL respectively. In case group TAG was found 72.59% and 27.41% in 40-160 mg/dL and >160 mg/dL respectively. In control group it was found 95.56% and 4.44% in 40-160 mg/dL and >160 mg/dL respectively.

5. Conclusion

In this environment, the study has provided point of departure values among hypertensives and non-hypertensives for renal parenchymal volume and cortical thickness. TC and TAG values were found significantly for the renal parameters such as the renal length, renal parenchymal volume, and cortical thickness. Compared to normotensive individuals, the cortical echogenicity was pointedly amplified in hypertensives. Essential hypertension strongly affects the cortical thickness and cortical echogenicity are shown in this study. In order to predict renal involvements in hypertensives by knowing of these parameters are related to renal function,

they may be useful. Especially in resource-poor settings, it will be useful to do ultrasonography of the kidneys as erudite renal scans with imaging modalities require ionizing radiation. These are typically expensive and unattainable. In our study, the measures of renal volume in patients were provided with essential hypertension in Rangpur region. Compared to the control counter parts, the renal size was somewhat smaller among hypertensive patients. A significant positive correlation with BMI, lipid profile and different renal conditions were shown in the renal sonographic parameter. Increased risk of possible renal damage was shown in the primary result of ours in individuals with essential hypertension. To conclude, we hereby recommend to correlate sonographical findings and to control and prevent their unwanted renal damage with hypertensive patients.

Authors' Contribution

TK, NR and MA created concept, performed the statistical analysis and drafted the manuscript. Investigated and edited by AA. Edited and resources by TA. All authors read and approved the final manuscript.

Competing Interest

The authors declare that they have no competing interests.

Ethics Approval and Consent to Participate

The study got ethical clearance from the Ethical Review Board from Institute of Biological Sciences (IBSc), University of Rajshahi, Bangladesh.

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