

ORIGINAL RESEARCH**Ultrasonographic findings in patients undergoing hemodialysis at Maharishi Markandeshwar Medical college and hospital, Solan**

¹Dr. Ria Krishna, ²Dr. Disha Gahlot, ³Dr. Mandeep Cheema, ⁴Dr. S.S Kaushal, ⁵Dr. J.S Bahia, ⁶Dr. Amandeep Singh

^{1,2,6}Post Graduate Resident, ³Associate Professor, ^{4,5}Professor, Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan, Himachal Pradesh, India

Corresponding author

Dr. Ria Krishna

Post Graduate Resident, Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan, Himachal Pradesh, India

Received: 13 November, 2022

Accepted: 17 December, 2022

ABSTRACT

Background: Chronic Kidney Disease (CKD) is the 12th most common cause of mortality and the 17th most frequent cause of disability across the globe. It has a remarkable effect on the quality of life. But, the burden of CKD continues to be an underestimation as the mortality in CKD patients is more probably due to cardiac complications caused due to reduced renal function before they reach to End Stage Renal Disease (ESRD).¹ Areas of main pathologies in native kidneys of patients who undergo dialysis, includes acquired renal cystic disease with recurrent malignant change.

Aim and objectives: To study the Ultrasonographic findings of patients undergoing hemodialysis.

Methods: This research was conducted out in the Department of Medicine of Maharishi Markandeshwar College and Hospital, Solan. A total of 50 patients undergoing hemodialysis were enrolled to study the Ultrasonographic findings.

Results: USG findings suggested raised cortical echogenicity of left kidney in 24 (48%) patients and 31 (62 %) had raised cortical echogenicity of right kidney. At least one kidney was involved in 42(84%) patients while 13 (26 %) patients had bilateral raised cortical echogenicity. Polycystic Kidney Disease was present in 2 (4 %) patients, small sized kidney was present in 26 (52 %) patients among which 14 were females and 12 were males. Cholecystitis was a rare presentation in 1 (2%) patient.

Conclusion: Ultrasound findings revealed raised cortical echogenicity of either left or right kidney (84 % patients) and small size of either kidneys (52 % patients) to be the most common findings in patients who underwent hemodialysis at Maharishi Markandeshwar Medical College and Hospital, Solan.

Keywords: Ultrasonography, Chronic Kidney Disease, Hemodialysis.

INTRODUCTION

Chronic Kidney Disease (CKD) is the 12th most common cause of mortality and the 17th most frequent cause of disability across the globe. It has a remarkable effect on the quality of life. But, the burden of CKD continues to be an underestimation as the mortality in CKD patients is more probably due to cardiac complications caused due to reduced renal function before they reach to End Stage Renal Disease (ESRD).¹ Areas of main pathologies in native

kidneys of patients who undergo dialysis, includes acquired renal cystic disease with recurrent malignant change.² Renal ultrasonography is one of the helpful imaging technique as it visualises the two kidneys, estimates their size, symmetry and presence of any obstruction or mass in the kidney.³ We took up this study on our institute's patients of renal failure undergoing hemodialysis due to lack of data in this area of the country and to study the ultrasonographic findings in patients undergoing hemodialysis at our institute.

METHODS

The present study was undertaken in the Department of Medicine in Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan. All the patients undergoing hemodialysis were enrolled to study the ultrasonographic findings.

STUDY TYPE

Hospital based Prospective Cross-Sectional study.

SAMPLE SIZE

50 cases

STUDY PERIOD

2021-2022

50 patients with clinical/investigational evidence of kidney failure undergoing hemodialysis were considered for the study. Patients fulfilling the inclusion criteria and after verifying the exclusion criteria were finally taken up for the study.

INCLUSION CRITERIA

1. Patients with clinical and/or investigational evidence of Renal Failure.
2. Patients undergoing hemodialysis in our hospital set up.
3. Patients above the age of 18 years.

EXCLUSION CRITERIA

1. Patient refusal to participate in the study
2. Patients below the age of 18.

INVESTIGATIONS

All the patients enrolled in the study were subjected to Ultrasound Scan of the Abdomen.

STATISTICAL ANALYSIS

The demographic data, examination and all the investigations along with the final result of the qualitative biochemical analysis report were recorded on Microsoft Excel 2013. All the analysis was done using SPSS Statistic Software for windows (Version 26.0 IBM Corp. Armonk, NY, and USA). Mean and Standard deviations were calculated for quantifiable variables. Mean and Standard deviations were calculated for quantifiable variables and were compared using T-test. Chi Square Test was used for data analysis. The continuous variables were analyzed by P value.

RESULTS

This study was conducted in Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan in Medicine Department. Total 50 patients with clinical/investigational evidence of kidney failure were recruited in the study. The clinical profile of patients undergoing hemodialysis was analysed in this study. Those patients who were not meeting the inclusion criteria in the study were excluded.

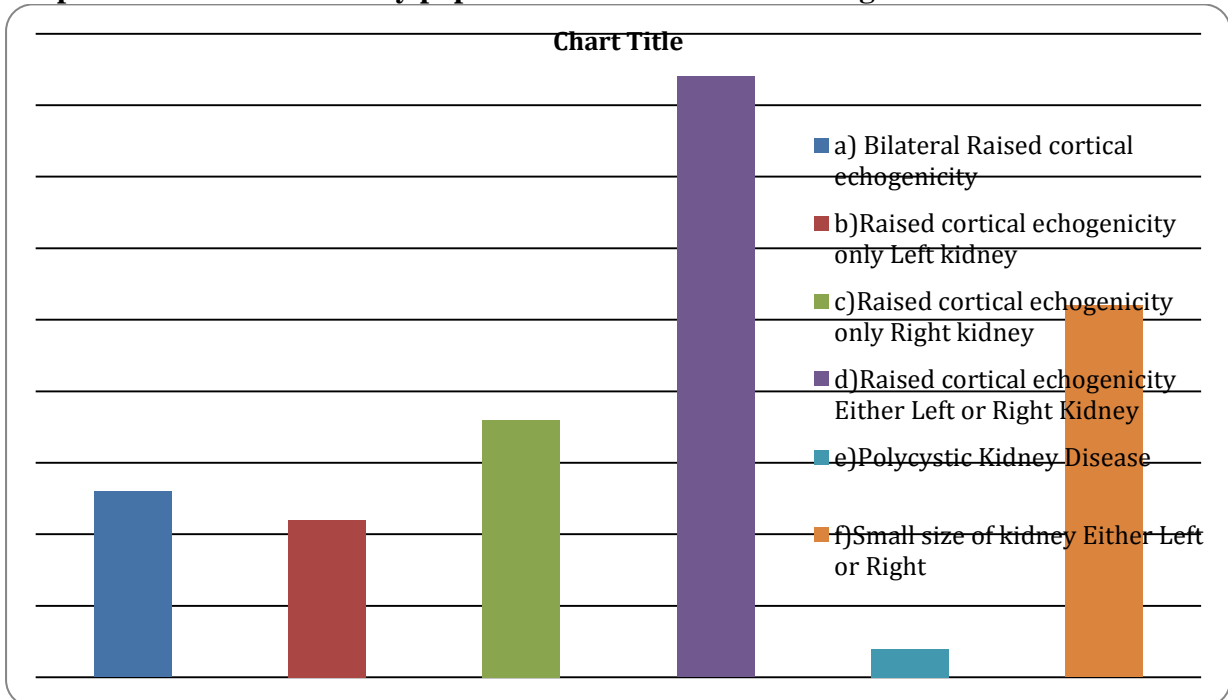
1. DISTRIBUTION OF PATIENTS BASED ON USG FINDINGS

USG revealed raised cortical echogenicity of left kidney in 24 (48%) patients and 31 (62 %) had raised cortical echogenicity of right kidney ,either left or right kidney was involved in 42(84 %) patients while 13 (26 %) patients had bilateral raised cortical echogenicity, polycystic Kidney Disease was present in 2 (4 %) patients, small size of either kidney in 26 (52 %) patients among which 14 were females and 12 were males while cholecystitis was a rare presentation in 1 (2%) patient.

Table 1: Distribution of study population based on USG findings

Findings	N (Frequency)
a) Bilateral Raised cortical echogenicity	13 (26 %)
b) Raised cortical echogenicity only Left kidney	11(22%)
c) Raised cortical echogenicity only Right kidney	18(36%)
d)Raised cortical echogenicity Either Left or Right Kidney	42(84 %)
e) Polycystic Kidney Disease	2 (4%)
f)Small size of kidney Either Left or Right	26 (52%)

Graph1: Distribution of study population based on USG findings



2. DISTRIBUTION OF PATIENTS BASED ON RAISED CORTICAL ECHOGENICITY

In present study, USG findings revealed raised cortical echogenicity of left kidney in 24 (48%) patients and 31 (62%) had raised cortical echogenicity of right kidney while 13 (26 %) had raised cortical echogenicity of both kidneys.

patients had bilateral raised cortical echogenicity. Either Left or Right Kidney was involved in 42 (84%) patients.

Table 2: Distribution of Patients based on Raised Cortical Echogenicity

Raised Cortical Echogenicity	No of patients (%)
Left Kidney	24 (48 %)
Right Kidney	31 (62%)
Bilateral Kidney (Both Right + Left)	13 (26 %)
Either Left or Right Kidney	42 (84%)

Graph 2: Distribution of patients based on Raised Cortical Echogenicity

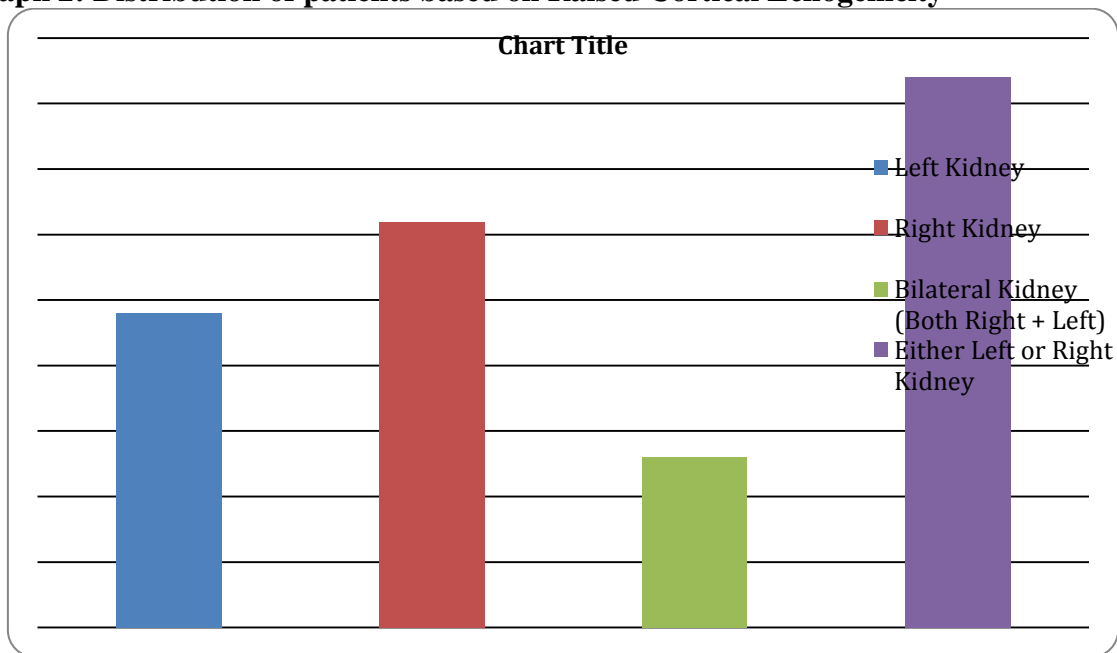
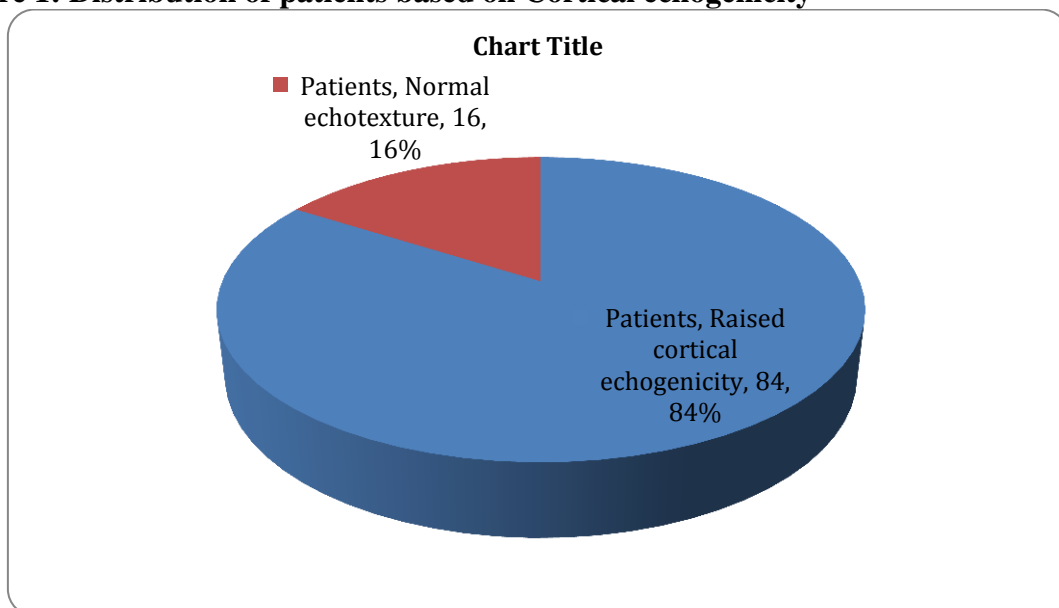


Figure 1: Distribution of patients based on Cortical echogenicity



3.DISTRIBUTION OF PATIENTS BASED ON SMALL KIDNEY SIZE

In present study, 26 (52%) patients had small kidney size among which 25 (50%) patients had small left kidney size and 23(46%) patients had small right kidney size out of which 22 (44%) patients had bilateral small kidney size. Either right or left kidney was small in 26(52 %) patients.

Table 3: Distribution of Patients based on Small Kidney Size

Small Kidney Size	No of patients (%)
Left Kidney	25(50 %)
Right Kidney	23 (46 %)
Bilateral kidney (Both Right + Left)	22 (44 %)
Either Left or Right kidney	26 (52 %)

Graph 3: Distribution of Patients based on Small Kidney Size

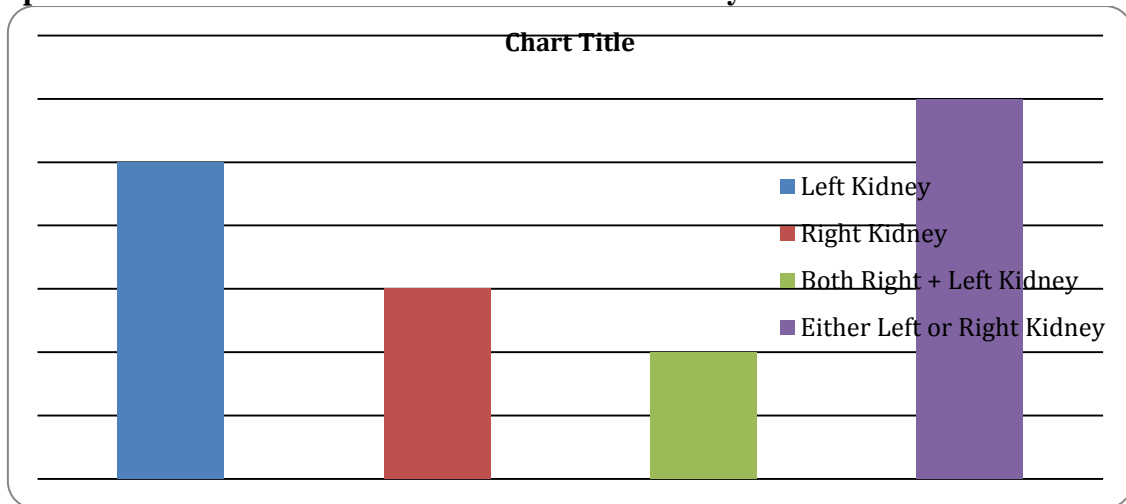
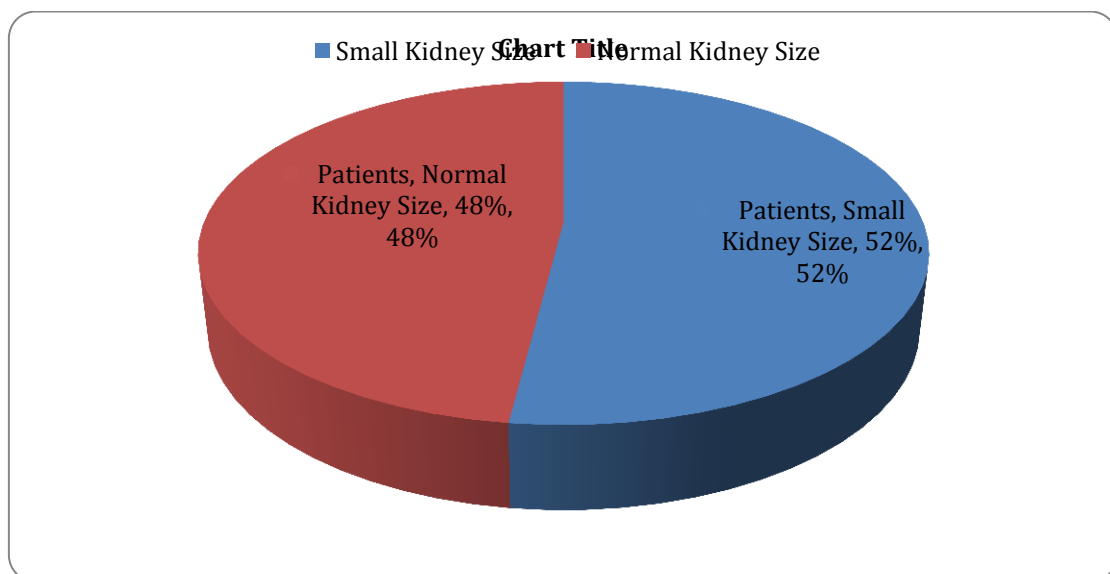


Figure 2: Distribution of Patients based on Kidney Size



DISCUSSION

The present study was undertaken in the Department of Medicine in Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan. Each patient subjected to hemodialysis in our hospital setup was taken up for the study. Detailed history of each patient was taken and a thorough examination was done. All the patients were enrolled to study the ultrasonographic findings in the patients undergoing hemodialysis. There is a decrease in the renal dimensions that manifests during the time period of months or even years in Chronic Renal Failure. Ultrasound shows a decrease in renal length as well as decrease in the renal cortical thickness associated with increase in the renal cortical echogenicity which is related with poor visibility of the renal sinus and renal pyramids, irregularities of the margins, papillary calcifications as well as parenchymal cysts.⁴ Dunn et al in the year 1977 first described ACKD and is known to be distinguished by formation of cysts filled with fluids which are multiple in number in ESRD patients who don't have a history of hereditary cystic disease and have undergone continuous dialysis. The process of manifestation of ACKD is accelerated with the time of dialysis, and moreover in older and male patients. The underlying renal insufficiency and creatinine levels have no remarkable effect on the manifestation of ACKD.²

Small kidneys demarcate chronic kidney disease in their advanced stage. Rare presentations include, Renal cystic disease, mainly the polycystic kidney disease of adult variety which may be the reason of renal insufficiency of the patients with enlarged kidneys bilaterally having cysts in multiple number of different sizes.⁵ In Chronic Renal failure patients, ultrasound reveals increase in the renal cortical echogenicity.⁶

In present study, USG findings suggested raised cortical echogenicity of left kidney in 24 (48%) patients and 31 (62%) had raised cortical echogenicity of right kidney, either left or right kidney was involved in 42 (84%) patients while 13 (26%) patients had bilateral raised cortical echogenicity, polycystic Kidney Disease was present in 2 (4%) patients, small size of kidney was present in 26 (52%) patients among which 14 were females and 12 were males while cholecystitis was a rare presentation in 1 (2%) patient. In a study done by Chaudhari et al, Renal size was reduced in about 80% of the patients, was normal in about 18% of patients and increased in 2% patients. The etiology was autosomal dominant polycystic kidney disease in a single patient with increase in the renal size.⁷ In a study done by Sutariya Nirav et al, the kidney size was reduced in 71% of the patients. The normal sized kidneys were present in 17% of the patients which is because of greater number of diabetic nephropathy cases in which normal kidney size is already described entity. Small and hyperechoic kidneys which are significant of CKD were present in the patients with reduced kidney size.⁸ In a study done by Awadia Gareeballah et al, the cortico-medullary differentiation was primarily disrupted in acute parenchymal disease in about 69.04% patients, lost in chronic end-stage parenchymal disease in 85% patients and 100% ESRD patients presented with raised cortical echogenicity in Ultrasound.⁹

These findings are congruent to the findings in our study which shows raised cortical echogenicity to be the most common ultrasound finding in CKD. A reduction in the size of kidney was the second most common feature and possibly manifests later than changes in the echogenicity of the cortex. To the best of our knowledge no previous studies were conducted to demonstrate the USG findings of patients undergoing hemodialysis in this population group.

CONCLUSION

Ultrasound findings revealed raised cortical echogenicity of either left or right kidney (84% patients) and small size of either kidneys (52% patients) to be the most common findings in

patients who underwent hemodialysis at Maharishi Markandeshwar Medical College and Hospital, Solan.

REFERENCES

1. Veerappan I, Abraham G. Chronic kidney disease: Current status, challenges and management in India. Ch. 2013;130:593-7.
2. Degrassi F, Quaia E, Martingano P, Cavallaro M, Cova MA. Imaging of haemodialysis: renal and extrarenal findings. Insights Imaging. 2015 Jun;6(3):309-21
3. Bargman JM, Skorecki. Chronic kidney disease. Harrison's principles of internal medicine, 29e: Mcgraw-hill New York, NY, USA.; 2015.
4. Petersen LJ, Petersen JR, Talleruphuus U, Ladefoged SD, Mehlsen J, Jensen HA. The pulsatility index and the resistive index in renal arteries. Associations with long-term progression in chronic renal failure. Nephrol Dial Transplant. 1997 Jul;12(7)
5. Khati NJ, Hill MC, Kimmel PL. The role of ultrasound in renal insufficiency: the essentials. Ultrasound Q. 2005 Dec;21(4):227-44.
6. Renal Cortical Thickness Measured at Ultrasound: Is It Better Than Renal Length as an Indicator of Renal Function in Chronic Kidney Disease? Michael D. Beland, Nicholas L. Walle, Jason T. Machan, and John J. Cronan American Journal of Roentgenology 2010 195:2, W146-W149
7. Chaudhari ST, Sadavarte AV, Chafekar D. Clinical profile of end stage renal disease in patients undergoing hemodialysis. MVP Journal of Medical Sciences. 2017:8-13.
8. Nirav S, Swati A, Divyen K, Nancy L, Atodadiya J, Arjun M. Evaluation of epidemiological and clinical profile of newly diagnosed cases of chronic kidney disease in a tertiary healthcare center: A prospective study. Intern J Contemp Med Res. 2018;5:E7-12
9. Awadia Gareeballah, Moawia Gameraddin, Hago Mustafa, Sultan Alshabi, Fath Elerahman Alagab, Jumaa Tamboul, Suliman Salih, (2015) Sonographic findings in renal parenchymal diseases at Sudanese. *Open Journal of Radiology*, **05**, 243-249

ETHICAL CONSIDERATION

Informed and written consent (in the language they best understand) was taken from each subject before collecting data. Only those individuals, who volunteer to participate in the study, were included and the data was kept confidential. The study has not imposed any burden on the subjects and the Institute. The Institutional Ethical Committee approved the study.