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ORIGINAL RESEARCH

Prevalence of Chronic Kidney Disease in Patients with Cardiovascular Disease

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Abstract
The chronic kidney disease, often known as CKD, is an urgent illness that affects people all over the globe. There is a tight physiological interaction between the heart and the kidneys, despite the fact that they are physically separated from one another by a significant distance inside the body and perform quite different roles. It is possible for disorders affecting the kidneys to cause problems affecting the heart, and vice versa. The most important component in the onset and progression of chronic kidney disease is hypertension, which refers to both high blood pressure and high blood pressure levels (CKD). The objective of preventing the progression of CKD is to lower blood pressure. Chronic abnormalities in cardiac function (such as chronic congestive heart failure), chronic kidney disease, and anemia appear to act together in a vicious circle in which each condition causes or exacerbates the other progressive chronic kidney disease. This may be due to the fact that chronic kidney disease appears to be caused by chronic abnormalities in cardiac function. The purpose of this research was to determine the prevalence of chronic renal disease in patients with cardiovascular disease who was receiving treatment at the JLNMC, Bhagalpur, Bihar. Methods: This is a cross-sectional research that was carried out between October 2021 to September 2022. The participants in this research included 220 people who had cardiovascular disease or hypertension for duration of more than six months. Every patient went through a comprehensive evaluation that included obtaining a full medical history, having a clinical exam, having a laboratory investigation, having an echo, and having an abdominal ultrasound. The findings of this study, which involved 220 patients who had cardiovascular disease or hypertension for more than 6 months, revealed the following: 75 (31.5%) of the patients were diagnosed with chronic kidney disease; Significant risk factors for renal impairment include uncontrolled hypertension, congestive heart failure, diuretics, and ACEI or ARBS plus diuretics used concurrently. Uncontrolled hypertension and diuretics are the most accurate predictors of renal impairment. Uncontrolled hypertension is the most avoidable cause of renal impairment; renal atrophy associated with RAAS does not induce renal impairment but does contribute to lower GFR in individuals with CKD. In order to

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prevent kidney damage and chronic cardiorenal, we have to exercise caution while using ACEIs or ARBS in combination with diuretics, or diuretics solo, and get the congestive heart disease under control.

Keywords: Uncontrolled Hypertension, Congestive Heart Failure, Chronic Kidney Disease, Diuretics, ACEI or ARBS.

Introduction

Chronic kidney disease, often known as CKD, is an independent risk factor for cardiovascular disease as well as a worldwide health burden that imposes a significant financial burden on the world's health systems (CVD). There is a correlation between all phases of chronic kidney disease and higher risks of cardiovascular morbidity, early death, and/or deterioration in quality of life [1].

Chronic kidney disease, often known as CKD, is characterized by a gradual but persistent loss of kidney function that cannot be reversed [2]. This loss of function causes the body to store fluid and toxins in increased amounts. There is a tight physiological interaction between the heart and the kidneys, despite the fact that they are physically separated from one another by a significant distance inside the body and perform quite different roles. It is possible for disorders affecting the kidneys to cause problems affecting the heart, and vice versa [2,3]. There is widespread consensus that hypertension and cardiovascular disease (CVD) are inextricably connected to chronic kidney disease [3].

There is a graded negative association between the risk of cardiovascular disease and the glomerular filtration rate (GFR), and this link exists regardless of age, sex, and other risk factors [1].

Chronic kidney illnesses cause a reduction in the amount of erythropoietin hormone that is released by the kidney. This in turn causes a reduction in the amount of red blood cells that are produced, which results in anemia. This anemia may result in left ventricular hypertrophy, which may or may not be accompanied with anemic heart failure [4]. It would seem that anemia, chronic renal disease, and congestive heart failure all work together to create a vicious loop in which one symptom either causes or makes the other condition worse [5]. Systemic hypertension is transferred to intra-glomerular capillary pressure, which leads to glomerulosclerosis and loss of kidney function. As a result, hypertensive people have a varying risk of compromised renal function, as stated in [6].

Patients who suffer from chronic kidney disease really need to have an accurate diagnosis and treatment for the underlying cause as soon as possible, or else start taking secondary preventative measures (CKD). The course of the illness could be slowed down or perhaps stopped entirely if these procedures are taken [5,6].

The purpose of this research was to determine the prevalence of chronic renal disease in patients with cardiovascular disease who was receiving treatment at JLNMC, Bhagalpur, Bihar.

Material and Methods

This was a cross-sectional study that took place between October 2021 to September 2022 at the JLNMC, Bhagalpur, Bihar. The participants were 220 patients who had been diagnosed with cardiac hypertension for more than six months.

Inclusion criteria

1) High blood pressure
2) Individuals suffering from ischemic heart disease
3) Patients that are suffering from congestive heart failure

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4) Patients who have cardiac conditions such as rheumatic heart disease or valvular heart disease
5) Age > 18 yr and <80 yr.

Exclusion criteria

1) Patients suffering from chronic liver disease that has worsened.
2) Patients who have a kind of terminal cancer.
3) Age < 18 yr and >80 year.
4) Diabetic patient.
5) A diagnosis of nephrotic syndrome was made on the patient.
6) A patient who is suffering from psychiatric and mental disease

Following an explanation of the study, patients gave their permission after being given all relevant information. The Ethical Committee of the JLNMC, Bhagalpur, Bihar, reviewed and authorized all of the study's procedures before they were carried out. For each patient, a comprehensive history, laboratory investigation, Doppler ultrasonography, and clinical examination were performed, with an emphasis on the following areas:

1) The medical history of patients who have been diagnosed with rheumatic heart disease, congestive heart failure, or vulvlar heart disease by echocardiogram and who have a more than 6-month history of diuretic use or ACE or ARBS use for more than 6 months. 2) The history of patients who have been diagnosed with hypertension for a long time and who have taken ACE or ARBS or and diuretics for more than 6 months. 3) The history of patients who have taken ACE Inquire about patients' ability to manage their hypertension with therapy. Systolic blood pressure less than 130 and diastolic blood pressure less than 80 (American heart association, 2018).
2) Examine pulse.
3) Take readings of your blood pressure to see whether or not it is under control. The average of three or four separate readings on a mercury sphygmomanometer was used to determine the patient's blood pressure. The first reading was not included in the calculations used to get the blood pressure. For people younger than 65 years of age and for adults younger than 65 years of age who had diabetes mellitus, adequate blood pressure management was defined as systolic blood pressure of less than 130 mm Hg and diastolic blood pressure of less than 80 mm Hg. The difference between the systolic and diastolic blood pressures was used to determine the pulse pressure, and a broad pulse pressure was defined as being more than 80 mm Hg [7].
4) An examination of the clogged veins in the neck and lower limbs to discover patients with congestive heart failure who have congestion in their bodies.
5) An auscultation of the first and second heart sounds as well as any extra heart sounds in order to diagnose valvular heart disease.
6) Tests performed in the laboratory include those for hemoglobin (in gm/l), uric acid (in mg/dl), creatinine (in mg/dl), aCR (in mg/gm), hemoglobin A1c (in mmol/mol), cholesterol (in mg/dl), triglycerides (in mg/dl), low-density lipoprotein (in mg/dl), and high-density lipoprotein (

On two separate occasions, with a gap of three months in between, we measure urea, creatin, and the ratio of alb to creatin. After that, we estimate GFR using the EPI CKD equation (chronic renal disease epidemiology cooperation) [8].

According to the chronic kidney disease epidemiology collaboration's EPI ckd equation, the following is the estimated glomerular filtration rate (eGFR) (in millilitres per minute per 1.73 square meters):

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(GFR = 141 min (Scr/, 1) max (Scr/, 1) 1.209 0.993 age 1.018 [if female] 1.159 [if black], while Scr is the serum creatinine measurement in mg/dL; k is 0.07 for women and 0.9 for males; is 0.329 for women and 0.411 for men; min denotes the minimum of Scr/ [8].
Patients with CKD are categorized in accordance with Kidgo 2012 (Table 1) [9].
Every patient will be placed into one of two groups, determined on their estimated glomerular filtration rate:
Patients who have been diagnosed with CKD make up Group I. (chronic kidney disease).
l Group II: patients diagnosed non CKD (nonchronic kidney disease).
Statistical analysis: After collecting and entering the data into the computer with the help of the SPSS (Statistical Package for Social Science) tool, which was designed specifically for statistical analysis (version 20; Inc., Chicago, IL).

Results

This study included 220 patients ranging in age from 30 to 80 years old (100 male and 120 female), the mean age of those patients is 60.5 + 9.5, the mean GFR are 87.03 22.3, the mean BMI was 32+3. 5. In the course of our research, we split patients into two distinct groups: group 1 individuals had been identified as having chronic renal disease. Patients in Group 2 were determined to have nonchronic renal disease based on their GFR results from the EPI.

Table 1. Classification of CKD patients according to KIDGO 2012.

GFR category GFR (ml/min/1.73m^2)	Terms	
G1	>90	Normal or high
G2	60 - 89	Mildly decreased*
G3A	45 - 59	Mildly to moderately decreased
G3B	30 - 44	Moderately to severely decreased
G4	15 - 29	Severely decreased
G5	<15	Kidney failure

Table 2. Patients demographics of all 220 patients.

Variable	Number (%)
Gender Male Female	100 120
CKD Yes No	80 140
Hypertension Yes No	175 45
Hypertension control Yes No	140 80
IHD Yes No	150 70
Congestive HF Yes No	35 185
Valvular diseases	30

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Yes No	190
ACEI/ARBs Yes No	165 55
Diuretics Yes No	60 160
ACEI/ARBs + Diuretics Yes No	55 165

Table 3. Patients laboratory data of all 220 patients.

Variable	Minimum	Maximum	Mean + SD
Age (Years)	30	80	60.5 + 9.5
BMI (Kg/m^2)	25	45	32+3.5
Hb (gm/l)	7.0	15.0	11.5 ± 1.5
Urea (mg/dl)	10.0	160.0	38.1 ± 21.5

BMI: body mass index, HB: hemoglobin, ALB/CR: albumin/creatin, LDL: low density lipoproteins, HDL: high density lipoproteins, GFR: glomerular filtration rate, HB A1C: hemoglobin A1C. -SD: standard deviation.

Table 4. Univariate binary logistic regression analysis.

Variable	Univariate binary logistic regression analysis	
	Odd (CI 95%)	P value
uncontrolled H.TN	17.5	0.000
Congestive HF	3.1	0.02
Diuretics	3.2	0.001
ACEI/ARBs + Diuretics	3.5	0.000

*Congestive HF Congestive heart failure, ACEI: angiotensin converting enzyme inhibitor, ARBs: amgiotension receptor blocker.

Table 5. Multivariate binary logistic regression analysis.

Variable	Multivariate binary logistic regression analysis	
	Odd (CI 95%)	P value
uncontrolled H.TN	18.1	0.000
Congestive HF	2.5	0.237
Diuretics	6.1	0.010
ACEI/ARBs + Diuretics	2.1	0.224

*Congestive HF Congestive heart failure, ACEI: angiotensin converting enzyme inhibitor. ARBs: amgiotension receptor blocker.

Table 6. Comparison between studied groups patient diagnosed as chronic kidney disease and patient free from renal impairment regarding demographics.

Variable	Group 1 CKD No (80)	Group 2 Non-CKD No (140)	P value
*Age (Years)	61.5 ± 11.5	60.6 ± 8.5	0.070 (NS)
#Gender Male no (%)	30 (41.5) 50 (58.5)	50 (39.2) 90 (60.1)	0.804 (NS)

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Female no (%)			
BMI (kg/m^2)	31.5 ± 3.5	32.1 ± 3.0	0.429 (NS)
Hypertension Yes no (%) No no (%)	60 20	110 30	0.107 (NS)
Hypertension control Yes no (%) No no (%)	20 60	90 50	0.000 (S)
IHD Yes no (%) No no (%)	50 30	120 20	0.111(NS)
Congestive HF Yes no (%) No no (%)	20 60	15 125	0.023 (S)
Valvular Disease Yes no (%) No no (%)	20 60	10 130	0.479 (NS)
ACEI/ARBs Yes no (%) No no (%)	50 30	100 40	0.944 (NS)
Diuretics Yes no (%) No no (%)	40 40	25 115	0.001 (S)
ACEI/ARBS + Diuretics Yes no (%) No no (%)	30 50	20 120	0.001 (S)

*: Mean + Standard deviation, #: Chi square. * BMI: body mass index, IHD: ischemic heart disease, congestive HF: congestive heart failure. ACEI: angiotensin receptor blockers, ARBS: angiotensin converting enzyme inhibitor.

Discussion

Chronic kidney disease (CKD) is a significant challenge for the health care industry because of the high morbidity and death rates it is linked with, as well as its rising prevalence and rising costs [10]. A lower glomerular filtration rate, also known as GFR, has been linked with an increased risk of cardiovascular problems, as well as higher morbidity and mortality. Patients who have cardiovascular illness or who have a high risk of developing cardiovascular disease are known to have a high prevalence of chronic kidney disease (CKD) [11].

Patients who already have chronic heart failure and have impaired renal function have an increased risk of mortality, cardiovascular death, and hospitalization due to increasing heart failure. This risk is increased on its own (CHF) Renal blood flow is the most important factor in determining renal function in patients with CHF [12]. Chronic heart failure, often known as CHF, affects a large number of people, is one of the leading causes of hospitalizations, and is linked with a high mortality and morbidity rate. There are several causes that may contribute to renal illness in persons who have heart failure. There is some evidence that suggests that renal function might serve as a barometer for cardiac function [13]. From October 2021 to September 2022, our research team conducted a cross-sectional study in JLNMC, Bhagalpur, Bihar, in order to determine the prevalence of chronic kidney disease in patients who were also suffering from cardiovascular disease.

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In all, this research comprised 220 patients, with ages ranging anywhere from 30 to 80 years old. Of the patients, 40% were men and 60% were females. Because diabetes is the primary predictor of renal impairment, we did not include any diabetic patients in our study because all of the patients had cardiac conditions lasting at least six months. These cardiac conditions included rheumatic, hypertensive, or congestive heart disease. The following is a breakdown of the patients into their respective groups:

Group 1 patients are those who have been diagnosed with CKD based on the EPI GFR, and Group 2 patients are those who have not been diagnosed with CKD based on the EPI GFR.

The purpose of this research was to determine the rate of chronic renal disease that is prevalent in cardiac patients.

Similar findings were found in a research carried out in Spain by Gorostidi et al., which showed that the prevalence of chronic kidney disease was 31% of the overall patient population in 63 patients. [14] In contrast to our research, the prevalence of chronic kidney disease was found to be 15.1% in a study conducted in Brazil by Alves et al. [15], who found that the prevalence of chronic kidney disease there was 36.6%.In a research that was conducted in Spain and published by Amenós et al. [11], the prevalence of CKD was found to be 37.3%. Our findings mirrored those of that study.

In the course of our research, we divided CKD patients into two groups: the first consisted of patients who were already aware that they had the condition and had been given a diagnosis of it; this group made up 80 (24 percentage points) of the total CKD patients; the second consisted of patients who had been screened for the condition; this group made up 140 (39 percentage points) of the total CKD patients. This helps to explain why a higher percentage of people in our research underwent screening, despite the fact that CKD knowledge is rather low.

Patient established CRF 18.9% and patient occult CRF 18.2% are two groups that are equivalent in number, contrary to the findings of another research that was published in Spain by Amenós et al. [11]. Our results are roughly comparable to those of another study that was reported in the United States. 29% of patients were aware that they had CKD. Murphy et al. [16]

According to Kidigo (2012), we found that the largest number of CKD patients in our study were in stage 3, which represent 40.3% of patient and this refers to our patient careless and not aware we also found that stage 1 present 27%, stage 2 present 28%, stage 4 represent 1.6%, and stage 5 represent 1.6%, this also found in another study reported in Spain by Gorostidi et al. [14] in which stage 3 represent t this also found in another study reported in Spain by

And also agree with the findings of the research that was conducted in Brazil by Alves et al. [15], which found that stage 1 affected 19% of patients, stage 2 affected 31%, stage 3 affected 35.8%, stage 4 affected 9.5%, and stage 5 affected 4.8% of patients. I concur with the findings of a research that was carried out in Spain and published by Amenós et al. [11]. The study found that 83.1% of participants had stage 3, 14.8% had stage 4, and 2.1% had stage 5. Unlike the findings of a study that was published in Brazil, which found that 2.3% of the population had stage 3 hypertension, our data come from a different population. Furthermore, we disagree with the findings of a study that was published in the United States that compared African Americans to Americans overall in terms of controlled hypertension. 25% had stage 1, 35% had stage 2, 33% had stage 3, and 6% had stage 4 CKD Murphy et al. [16].

In this research, we evaluate two groups with respect to several demographics and risk factors in order to identify the factor that poses the greatest threat of renal impairment.

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In terms of hypertension, age, gender, body mass index (BMI), ischemic heart disease (IHD), and vulvovaginal heart disease, our findings showed that there was no significant difference between the two groups.

In our research, the BMI scoreswith a mean of 32 ±3.5. We did not find a statistically significant difference in BMI between the two groups, which is comparable to the findings of Amenós et al. [11], who also reported that BMI did not vary significantly between the two groups, but that obese patients were more likely to suffer from chronic renal failure.

We did not find any statistically significant differences in age between the two groups, although CKD impacted the elderly more than this, which is in agreement with Gorostidi et al. [14] According to Amenós et al., those who had CKD were significantly older than those who had normal renal characteristics, with an average age of 61.5 years compared to 44.4 years, respectively. [11], in which there was no significant difference regarding age, although CRF was higher in patients who were older.

According to our research, there was no statistically significant difference between the sexes, although the proportion of females afflicted was much higher than that of males (58.7% vs 41.3%), which is in line with the findings of Amenós et al. [11] males with a prevalence of 25% were impacted, and they disagree with Gorostidi et al. [14], in which the percentage of males who are afflicted is three times more in men than it is in women (7.3% vs. 23.1%), men are affected with (75.4%).

According to our findings, the number of patients with vulvlar heart disease accounts for approximately 9% of the total population, while ischemic heart disease accounts for approximately 72.5% of the total population. The prevalence of chronic kidney disease (CKD) in vulvlar and IHDS was 11.1% and 65.1% of CKD, respectively. Regarding IHDS as well as vulvovaginal heart disease, we could not find any significant differences between the two groups. This concurs with the findings of Song et al. [17] this condition, in which there is no substantial difference regarding renal function, often develops in the elderly in relation to valvular heart disease and has a considerable impact on the outcomes over the long run.

Our research found that around 170 hypertension individuals had a percentile of 82.5, which is in contrast to the findings of a study carried out in Spain and published by Gorostidi et al. [14].

According to the findings of our research, hypertension affects approximately 37 percent of the total population. The prevalence of chronic kidney disease (CKD) in hypertension patients was 28 percent of all subjects, and the percentage of CKD patients who had hypertension was 88.5 percent. This contradicts the findings of Alves et al. [15] the same research was done in Brazil, and they found that the frequency of chronic kidney disease in hypertension patients was 17.3%.

According to the findings of our research, hypertension is the leading contributor to renal impairment; however, there is no significant difference between the two groups with regard to hypertension. A study conducted in Spain by Amenós et al. found that approximately 78.9 percent of hypertension patients who did not have CKD agreed with their findings. [11], in which CKD patients had a hypertension prevalence of 91.8% and non-CKD patients had a hypertension prevalence of 78.7%, there was no significant difference between the two groups.

Uncontrolled hypertension was found to be the most significant risk factor for renal impairment in our research, accounting for approximately 82.1% of all CKD patients. Controlled hypertension was found to be an important preventable cause of renal impairment, with 17.9% of controlled patients developing CKD and 78.9% of non-CKD patients developing the condition. These findings are comparable to those of a study that was conducted in the United States and published by Murphy et al. [16], in which the percentage of CKD Also agree with the findings of another research that was carried out in Saudi Arabia

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and published by Almalki et al. [18]. This study found that uncontrolled hypertension accounted for 78.1% of the cases and was related with other comorbidities such as renal impairment.

Ischemic heart disease was found in 170 patients, accounting for 72.5% of the total patient population; congestive heart failure was found in 35 patients, accounting for 14% of the total patient population; and vulvlar heart disease was found in 30 patients, accounting for 9% of the total patient population. The prevalence of chronic kidney disease was found to be 65.1% in IHDS, 22.2% in congestive HF, and 11.1% in vulvlar diseases. I am not in agreement with the research that was conducted in Spain Gorostidi et al. [14] cardiovascular disease affects around 2.2% of the whole population, while chronic kidney disease has a prevalence of approximately 15.1% among those with CVD. We disagree with the findings of another study that was carried out in the United States and published by George et al. [19]. According to that study, the prevalence of CKD in HF was 28.3%, and the percentage of decline in GFR was 22%. However, there is a significant difference between our findings and those of that study when it comes to HF, as our research found that the prevalence of CKD in non-congestive HF was 1.6%. This helps to explain why uncontrolled congestive heart failure is commonly linked with a fast decline in renal function and why appropriate treatment of congestive heart failure may delay the progression of renal impairment.

Additionally, the results of our research showed that there was a considerable gap between the two groups with respect to uncontrolled hypertension, congestive heart failure, diuretics, and ACEI/ARBS with diuretics.

Our findings showed that the prevalence of CKD among patients who had a history of using diuretics was 44%, which corresponds to a percentage of 22% of the entire patient population. These findings contradict the findings of a research that was conducted in Brazil by Alves et al. [16] the percentage of people who utilize diuretics is 78%. According to the findings of our study, the prevalence of CKD among patients using diuretics was about 36.5% of those with CKD and approximately 11.5% of all patients. When it comes to the consumption of diuretics, there is a notable distinction between two categories. This is consistent with the findings of a research that was conducted and published in Europe by De Silva et al. [20] there was a statistically significant difference between diuretic use for more than six months in H.F and the prevalence of kidney dysfunction in the group taking diuretics, which was approximately 63%. This increased the risk of kidney dysfunction by 50%, and the study found that there was a difference between the two groups regarding diuretic use.

This agrees with the findings of a research conducted in Brazil by Alves et al., which found that 76.5% of patients who took ACEI or ARBS in the present study did so. 67% of patients in this study are taking ACEI, whereas just 4.5% are getting ARBs. Our findings showed that the prevalence of CKD in patients taking ACEI or ARBS was 76.2% of those with CKD and 24% of all patients. We discovered that there was no significant difference between the two groups in terms of their history of taking ACEI or ARBS, which is in agreement with a study that was conducted in the United States and published by McCallum et al. [21], in which GFR decreased in a group talking ACE or ARBS statistically increased risk for kidney dysfunction, the risk is limited to the early phase; however, there was no significant difference between the two groups regarding talking ACEI or ARBS prevalence of CKD in ARBS use around 33% prevalence of group take placebo around with no significant difference regarding ACEI or ARBS taking.

According to our findings, there was a substantial difference between the two groups in terms of less parenchyma, shorter lengths, and increased echogenicity. These findings are in agreement with a research that was conducted in India and published by Maneesha et al. [22]

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The researchers discovered that a reduction in length and parenchyma was only seen in the last stage of CKD, and that this decline correlates with a rise in creatinine.
Uncontrolled hypertension [odds ratio (95% CI), 17.5, p 0.000], congestive heart failure [odds ratio (95% CI), 3.1, p 0.02], diuretics [odds ratio (95% CI), 3.2, p 0.001], and ACEI/ARBs + Diuretics [odds (95%), 35%]
Uncontrolled hypertension was shown to be the greatest predictive risk factor for renal impairment, according to the multivariant binary logistic analysis that we conducted, which showed an odds ratio of 17.5, with a significance level of p 0. .000] in which uncontrolled hypertension was the most risk factor for renal impairment and another predictive risk factor for renal impairment is diuretics [odds (95% CI), 6.1, p 0], we agree with Murphy et al. [16] and also with Wright et al. [23], who found that diuretics are another risk factor for renal impairment .010] disagree with the findings of Clark et al. [24] but agree with the findings of Alves et al. [14].

Conclusion

Patients with cardiac conditions who have uncontrolled hypertension, patients who use diuretics, patients who take ACEI or ARBS, and patients who have congestive heart failure are all substantial risk factors for renal impairment.

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