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RESEARCH ARTICLE

"A CROSS SECTIONAL STUDY ON PREVALENCE OF LEFT VENTRICULAR DYSFUNCTION AND ITS CORRELATION WITH ESTIMATED GLOMERULAR FILTRATION RATE (eGFR) IN CHRONIC KIDNEY DISEASE PATIENTS IN A TERTIARY CARE CENTRE IN CHENGALPATTU DISTRICT"

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Abstract

Introduction:-

Chronic kidney disease (CKD) is a spectrum of pathophysiological process that is associated with dysfunction of kidney and a progressive decrease in Glomerular Filtration Rate (GFR). [1]It refers to functional or structural abnormalities of kidneys for more than three months, irrespective of cause. It is a global health concern. CKD has been the 12th leading cause of death, and the 17th leading cause of disability.

CKD has a number of co-morbidities and hence is a disease with high mortality.[2] An analysis of risk factors for development and progression of CKD is necessary in clinical practice. The result of CKD is loss of kidney function which in the long run leads to kidney failure, decreased kidney function and its complications, development of cardiovascular disease and death.[3] Improving outcomes in CKD requires prevention, detection, evaluation, and management of other chronic diseases, such as hypertension, hypercholesterolemia , diabetes and obesity.

The number of CKD patients is on the rise. The prevalence rate of CKD in India is not available due to lack of adequate data recording. In community based studies, the prevalence rate of CKD is from 0.79% to 1.4%. The studies were done to detect stage 3 CKD or worse. The exact prevalence is higher than the one reported. The end stage renal disease (ESRD) incidence is reported as 160 to 232 per million population and the projected ESRD prevalence rate was 785 to 870 per million population.[4] Screening and Early Evaluation of Kidney disease (SEEK); a community based study which was done recently reported a very high prevalence rate of CKD which is about 17.4%.[5]

Echocardiography will provide us with a very simple and noninvasive assessment of the structure and function of the heart. It also helps us to identify the people who are at greater risk. Strategies to prevent the development and progression of LV dysfunction at an early stage may prove more effective.

Aims And Objectives:-

1. To assess the prevalence of Left Ventricular (systolic and/ or diastolic) dysfunction in patients with CKD.
2. To evaluate the correlation between Left Ventricular dysfunction and eGFR in CKD patients

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Material And Methods:-

Study design :
Cross sectional study

Study setting:
General medicine, Cardiology and Nephrology department of Karpaga Vinayaga institute of Medical sciences and research centre ,chengalpattu district, Tamilnadu.

Study duration:
6 months

Study population:
Patients attending cardiology, Nephrology and General medicine opdof Karpaga Vinayaga institute of Medical sciences and research centre and also inpatients under medicine department after verifying inclusion and exclusion criteria

Inclusion criteria :
Age > 18 years upto 70 years , both sex, with established Chronic Kidney Disease
Those who have not received any forms of renal replacement therapy.
H/O Systemic hypertension

Exclusion criteria:
Patients with Acute Kidney Injury
Patients with history and clinical features suggestive of preexisting cardiac diseases like rheumatic valvular heart disease, congenital heart disease, coronary heart disease, cardiomyopathy and pericardial diseases. Patients on dialysis and kidney transplant patients
Patients who are diabetic

Sample Size Calculation:
The prevalence of diastolic dysfunction was reported as 67.2 % by Tarun Rao (2018) in the recent edition of International Journal of Advances in Medicine. With this reference and assuming a 95% confidence interval, 5% absolute precision value, and with the available population size of 540, the minimum requiredsample size will be 208 ~ 210.

$$n = \frac{Z^2_{1-\frac{\alpha}{2}}\, p(1-p)}{d^2}$$

Sampling Type : Purposive sampling

Operational definitions
Cases were classified into different stages of Chronic Kidney Disease based on estimated Glomerular filtration rate (eGFR). eGFR was calculated using Cockcroft-Gault equation
CrCl or eGFR = (140-age) (Body weight in Kg) / (Serum creatinine) x (72)
x 0.85 if female

1. Stage 1 with normal or high GFR (GFR > 90 mL/min)
2. Stage 2 Mild CKD (GFR = 60-89 mL/min)
3. Stage 3A Moderate CKD (GFR = 45-59 mL/min)
4. Stage 3B Moderate CKD (GFR = 30-44 mL/min)
5. Stage 4 Severe CKD (GFR = 15-29 mL/min)
6. Stage 5 End Stage CKD (GFR <15 mL/min)
7. Patients with EF < 50% were accepted as having LV systolic dysfunction
8. Diastolic dysfunction was graded according to the ratio of transmitral early (E) and late (A) flow velocities (E/A ratio)
   E/A ratio < 0.8- Grade 1
   0.8 to 1.5- Grade 2

>2- Grade 3

Results:-

Table 1:- Age distribution of study participants with respect to stage of CKD.

STAGES	AGE ≤40	41 TO 50	51 TO 60	>60
1	3	7	2	2
2	2	7	9	10
3	12	16	19	16
4	8	20	29	48
TOTAL	25	50	59	76

Table 2:- Sex distribution of study participants.

Sex	Frequency	Percentage
Male	145	69
Female	65	31
Total	210	100

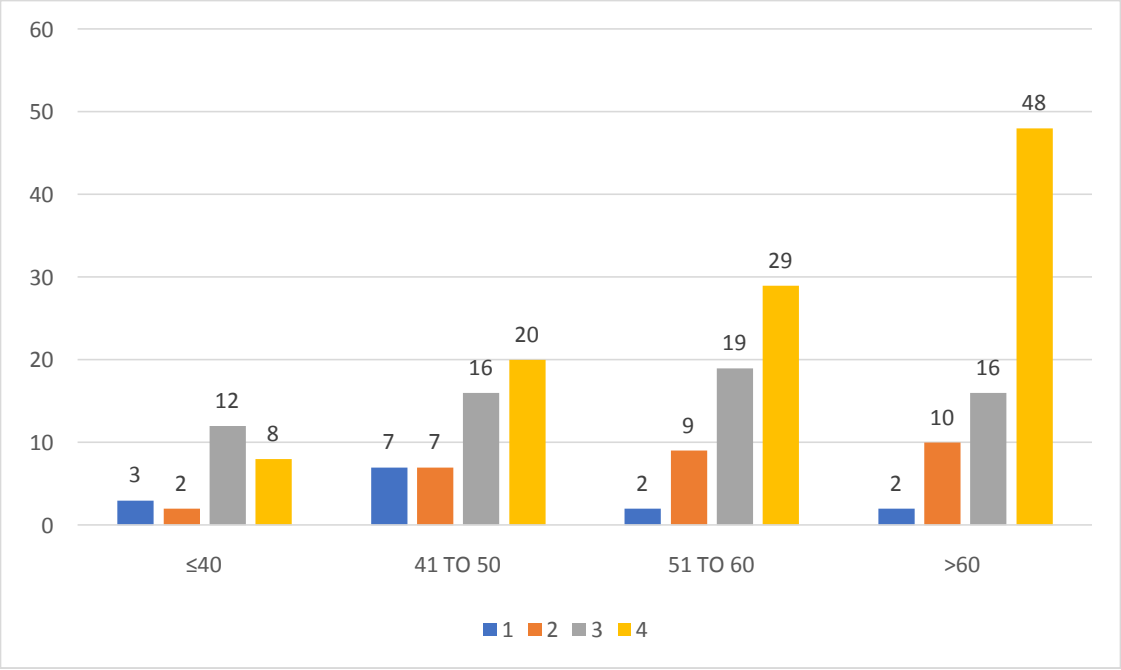
Table 3:- Prevalence of systolic dysfunction among study participants.

Stages	Frequency	Percentage
1	1	4
2	3	12.5
3	5	211
4	15	62.5
Total	24	100

Table 3:- Prevalence of diastolic dysfunction among study participants.

Stages	Frequency	Percentage
1	4	5
2	18	22
3	20	24.5
4	40	48.5
Total	82	100

Figure 1:- Age wise distribution of study participants.



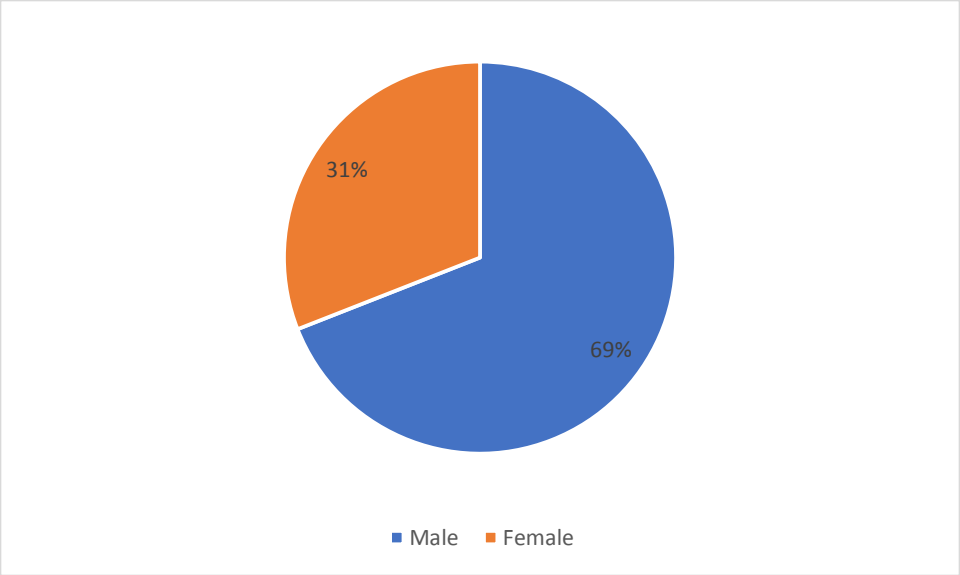


Figure 3:- Left ventricle dysfunction among study participants.

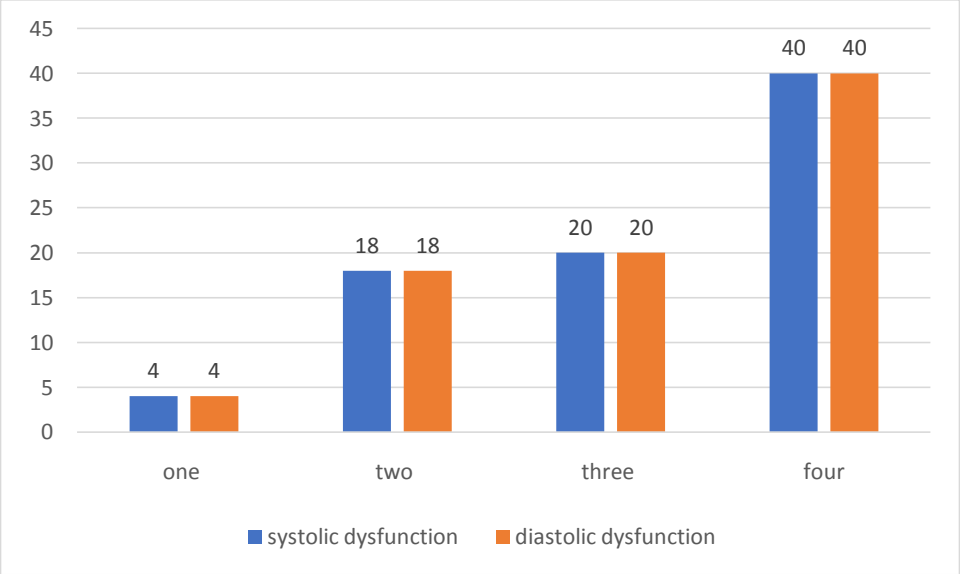


Figure 4:- Correlation between eGFR AND DIASTOLIC dysfunction.

Discussion:-

In the present study about 36% were in the age of more than 60 years.Thus we have shown in our study that the prevalence of CKD is most prevalent in 4th – 6th decade. In India, CKD is reported within the mean age of 50 years. In SEEK study; CKD has a mean age group of 45 years.[5]

Sex distribution in study population:

In my study, 69 % of CKD patients were males, and 31% CKD patients were females. This shows that CKD is more common in males than in females. This is in accordance to the SEEK study [5] where males showed a higher prevalence than females. The Indian CKD registry [6]show that the CKD male: female ratio was 70: 30. The age and gender distribution of the population in both the study and control groups were almost equal and were comparable.

LV diastolic dysfunction is frequent among CKD patients and may produce heart failure and mortality. It has been reported that in ESRD, diastolic dysfunction deteriorates in parallel with LVH. [7,8] The negative outcome is stronger in patients with diastolic failure. [9]

Diastolic dysfunction in CKD may occur early even in the absence of LVH According to Pearson's correlation coefficient; the correlation between eGFR and diastolic dysfunction was calculated and R value obtained was R= -.90682

This showed that there is a moderate negative correlation between eGFR and diastolic dysfunction. That is as the eGFR decreases, the diastolic dysfunction increases.

Conclusion:-

Left ventricular diastolic dysfunction is more significantly associated with the decline in eGFR than systolic dysfunction in CKD patients. This is found to occur at an earlier stage of CKD , even without LVH. Thus diastolic dysfunction is a much better predictor for cardiovascular mortality .Echocardiography provides a simple, non-invasive investigation that can identify even asymptomatic patients at an earlier stage of CKD. So, earlier screening of CKD patients for LV diastolic dysfunction can be recommended.

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