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Research Article

A Cross Sectional Study to Analyse the ECG Changes in CKD Patients of Kanyakumari Government Medical College

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Abstract

Background: ***Chronic Kidney Disease*** *(CKD) encompasses a spectrum of different patho physiologic processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate. Chronic kidney disease (CKD) is associated with increased risk of cardiovascular disease. Electrocardiographic (ECG) abnormalities are common in CKD patients. In this study ECG changes of CKD patients attending medicine department of kanyakumari Government medical college is analysed.*

Methodology: *An Cross sectional study was conducted in Medical ward of Kanyakumari government medical college, Asaripallam with Sample size of 90 patients of CKD with Study period of 6 months from October 2017 to march 2018.*

Results: *In this study the mean age of study population is 57.8years, with mean serum creatinine of 6.9mg/dl. Left Ventricular Hypertrophy is the most common ECG finding followed by sinus tachycardia in this study.*

Conclusion: *Patients with chronic kidney disease (CKD) had high frequency of abnormal electrocardiographic findings. All hospitalized CKD patients should undergo ECG to screen for cardiovascular disease.*

Keywords: *Chronic Kidney Disease (CKD), Electrocardiography (ECG), Left Ventricular Hypertrophy (LVH), Estimated GFR (eGFR).*

Introduction

Chronic Kidney Disease (CKD) encompasses a spectrum of different pathophysiologic processes associated with abnormal kidney function and a progressive decline in glomerular filtration rate . The dispiriting term end-stage renal disease represents a stage of CKD where the accumulation of toxins, fluid, and electrolytes normally excreted by the kidneys results in the ***uremic syndrome.*** This syndrome leads to death unless the toxins are removed by renal replacement therapy, using dialysis or kidney transplantation.[1] The normal annual mean decline in GFR with age from the peak GFR (~120 mL/min/1.73m^2) attained during the third decade of life is ~1 mL/min/ year/ 1.73 m^{2,} reaching a mean value of 70 mL/min/ 1.73 m^2 at age 70. The mean GFR is lower in women than men.[2]

Aims & Objectives

The aim of the study is to analyse the electrocardiographic changes in CKD patients of

kanyakumari government medical college and their significance with CKD.

Background

In India, the Indian Society of Nephrology (ISN) has developed a CKD registry wherein epidemiological data of CKD patients is collected and analysed. A recent report of this registry shows that patients first presented to a nephrologist at stage 5 in 47.5%, stage 4 in 25.5%, stage 3 in 19.6%, stage 2 in 4.9% and stage 1 in 2.5%. It is very unfortunate that 50% of patients present for the first time to a nephrologist in CKD stage 5, when they cannot be offered anything more than dialysis or transplantation.[3]

Cardiovascular disease is the leading cause of morbidity and mortality in patients at every stage of CKD. The incremental risk of cardiovascular disease in those with CKD compared to the age- and sex-matched general population ranges from 10- to 200-fold, depending on the stage of CKD. Between 30 and 45% of patients reaching stage 5 CKD already have advanced cardiovascular complications[4]. The presence of any stage of CKD is a major risk factor for ischemic cardiovascular disease, including occlusive coronary, cerebrovascular, and peripheral vascular disease[4.]

Materials and Methodology

This study is a hospital based Cross sectional study with Sample size of 90 patients of CKD admitted in Medical ward of Kanyakumari government medical college, Asaripallam between October 2017 to March 2018 with a Study period of 6 months. A 12 lead ECG is taken in all cases of eGFR of less than 60ml/mt/1.73m^2 and ultrasonogram shown changes of CKD under the study and analysed with SPSS software

Inclusion and Exclusion criteria

Patients of either sex of age less than 80yrs, Estimated GFR (eGFR) <60ml/mt/1.73/m^2, Diabetes Mellitus, Systemic Hypertension, are included in the study. Patients with Coronary artery disease, Cerebro vascular disease, Hypothyrodism, hyperthyroidism, Chronic Obstructive Pulmonary Disease, Congenital Heart Disease, malignancy are excluded from the study.

Results

In this study totally 90 patients of CKD patients admitted in medical ward of kanyakumari government medical college is studied. The mean age of the patient under study is 57.8 years. In this study male predominates the female in ratio of 1.8:1.The mean serum creatinine of the study group is 6.9mg/dl. The mean eGFR of the study population is 9ml/mt/1.73m2 .88.9% patients in study group have some ECG abnormalities, amoung the ECG abnormalities Left Ventricular Hypertrophy is the most common finding seen in 67.7% followed by sinus tachycardia in 37.7%.

Discussion

CKD is classified as Stage 1 Slightly diminished function; kidney damage with normal or relatively high GFR (≥90 ml/min/1.73m^2) and persistent albuminuria. Kidney damage is defined as pathological abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.[5,] Stage 2 Mild reduction in GFR (60–89 ml/min/1.73 m^2) with kidney damage. Kidney damage is defined as pathological abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.[5] Stage 3 Moderate reduction in GFR (30–59 ml/min/1.73m^2). British guidelines distinguish between stage 3A (GFR 45–59) and stage 3B (GFR 30–44) for purposes of screening and referral.[5], Stage 4 Severe reduction in GFR (15–29 ml/min/1.73m^2) [5], Stage 5 Established kidney failure (GFR <15 ml/min/1.73m^2), permanent renal replacement therapy,[5] or end-stage kidney disease. Equation from the Modification of Diet in Renal Disease study *is Estimated GFR (mL/min per 1.73 m2) = 1.86 × (SCr) −1.154 × (age)−0.203 Multiply by 0.742 for women*[6]

The mean age of the patient under study is 57.8 years. Most of the patients are in the age group of 61-70years constitutes about 31.1%, followed by

51 – 60 years constitutes about 30%.The distribution of CKD in different age group is given in figure 1.

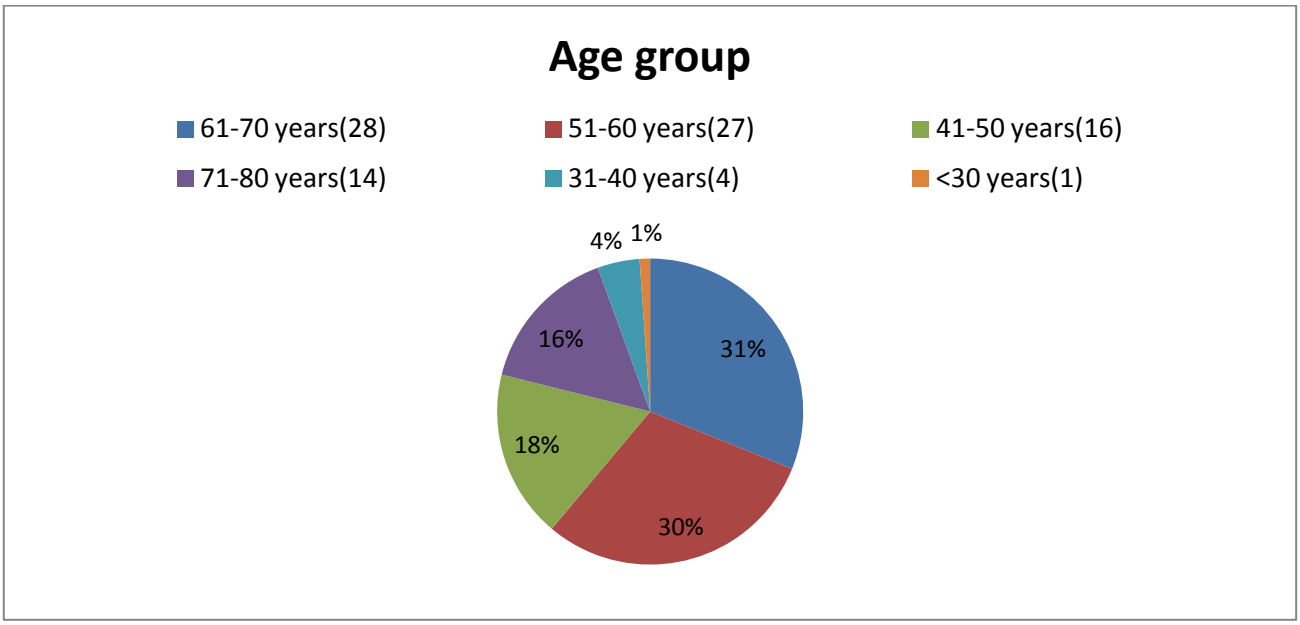

Figure 1

Totally 59 males and 31 females are included in this study in the ratio of 1.8:1, and it's distribution is given in figure 2. Most of the patients under study have creatinine value between 5 and 10mg/dl (n=57, 63.3%) and its distribution is given in figure 3. The mean eGFR of the study population is 9ml/mt/1.73m2

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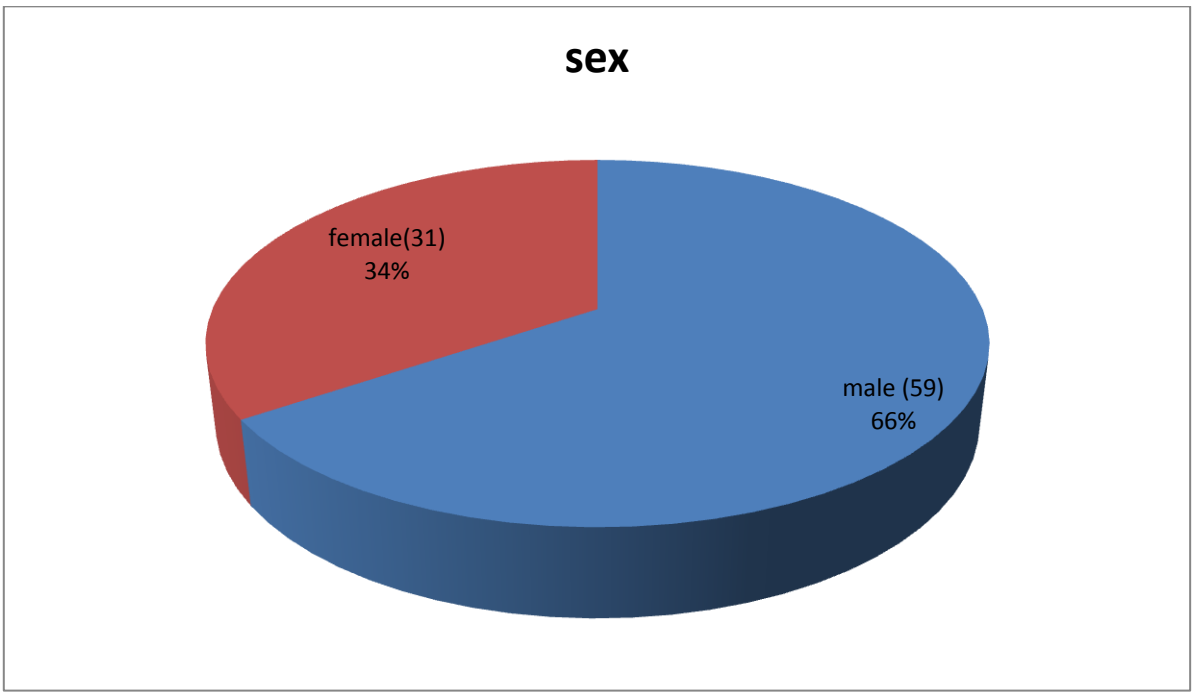

Figure 2

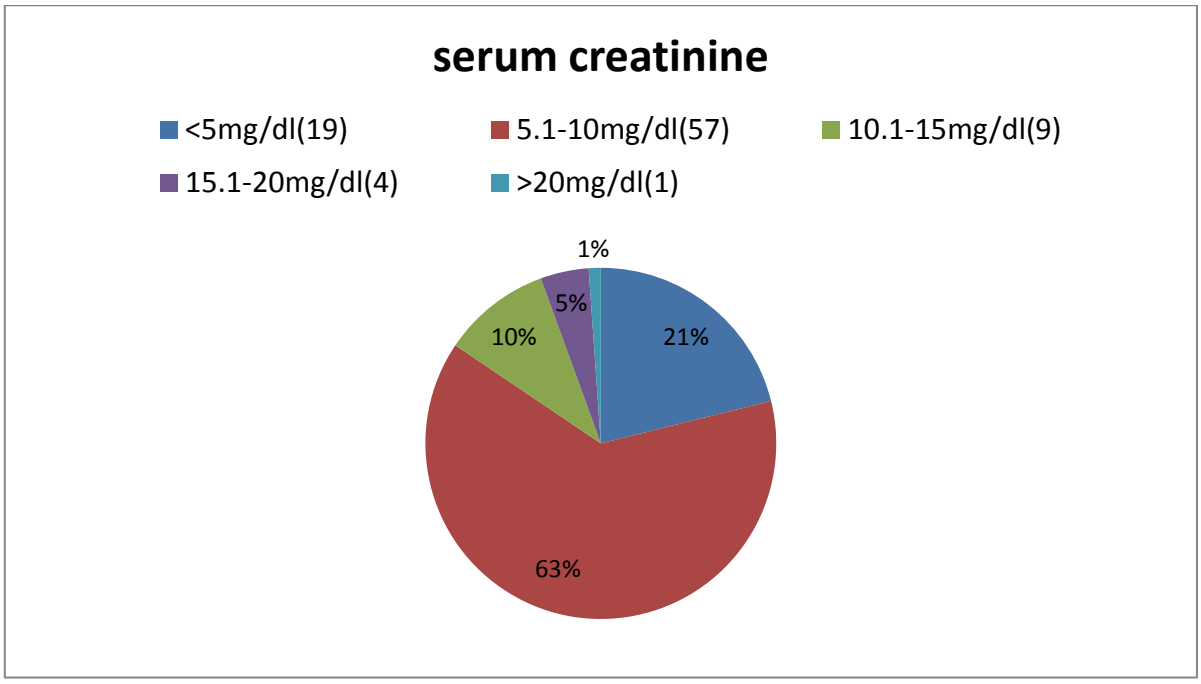

Figure 3

88.9% (n=80) patients in study group have some ECG abnormalities. Almost all the cases have multiple ECG abnormalities, among the ECG abnormalities Left Ventricular Hypertrophy is the most common finding seen in 67.7% (n=61)followed by sinus tachycardia in 37.7%. *ECG Abnormalities in patients with CKD* by Salman Shafi et all results LVH is the most common ECG abnormality[7]. *ECG changes and cardiac arrhythmias in chronic renal failure patients on hemodialysis* by Shapira OM et all indicate that patients with chronic renal failure frequently exhibit ECG changes and a high incidence of ventricular and supraventricular arrhythmia[8]. None of the patients in this study have supraventricular tachycardia.

Electrocardiographic findings in chronic hemodialysis patients Luís Henrique Bignotto et all tells there is high prevalence of patients with prolonged QTc interval.[9]. In this study only 9 patients (10%) had prolonged QT Interval. Left ventricular hypertrophy in CKD may be due to hypertension. Hyperkalemia in CKD is a cause for various ECG abnormalities like tall T waves, AV block, sine wave pattern. Hypocalcemia in CKD may be a cause for prolonged QT interval. The various ECG abnormalities observed in the study is given in table 1.

Table 1

S.NO	ECG Abnormality	N=90	Percentage
1	Normal	10	11.1
2	Left Ventricular Hypertrophy	61	67.7
3	Sinus tachycardia	34	37.7
4	Left Axis deviation	28	31.1
5	Tall T waves	11	12.2
6	Sine Wave Pattern	2	2.2
7	T inversion in inferior & lateral leads	17	18.8
8	AV block	4	4.4
9	P Pulmonale	10	11.1
10	Sinus Bradycardia	13	14.4
11	Low Voltage complex	7	7.7
12	Left Bundle Branch Block	6	6.6
13	Right Bundle Branch Block	2	2.2
14	Multi Atrial tachycardia	1	1.1
15	Ventricular premature contraction	4	4.4
16	Right ventricular hypertrophy	1	1.1
17	Prolonged QT interval	9	10
18	Right Axis Deviation	3	3.3

Conclusion

Left ventricular Hypertrophy is the most common finding in this study. Only 10 patients in this study

has normal ECG. Hence all hospitalized CKD patients should undergo ECG to screen for cardiovascular disease and a predictor of electrolyte abnormalities like hyperkalemia and hypocalcemia.

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