VOLUME - 9, ISSUE - 12, DECEMBER - 2020 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

General Medicine

EVALUATION OF THYROID FUNCTION IN PATIENTS WITH CHRONIC KIDNEY DISEASE

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ABSTRACT

BACKGROUND: Chronic kidney disease (CKD) is a clinical syndrome due to irreversible renal dysfunction leading to excretory, metabolic & synthetic failure culminating into accumulation of non-protein nitrogenous substances and present with various clinical manifestations. Since kidney competes with iodide clearance, Thyroid hormonal system is affected. So its important to evaluate for thyroid function in CKD patients.

AIMS AND OBJECTIVES: To evaluate thyroid function in patients with chronic kidney disease and its correlation with severity of CKD.

MATERIALS AND METHODS: An cross sectional study of 50 cases of chronic kidney disease. A detailed history, a thorough clinical and general examination, blood investigations (serum creatinine, thyroid profile, t3, t4, TSH).Data collected and statistically analyzed.

RESULTS: Out of these 50 patients of chronic kidney disease who are on conservative management & fulfilling the inclusion criteria, 23 patients (46%) are euthyroid, 17 patients (34%) had subclinical hypothyroidism,10 patients (20%) had overt hypothyroidism.

CONCLUSION: it is found that reduced eGFR is associated with an increased prevalence of SCH and clinically overt hypothyroidism. Physicians treating patients with CKD should be aware that CKD and hypothyroidism may shows overlapping symptom complexes & should go for an prompt evaluation of thyroid function in suspected cases.

KEYWORDS : CHRONIC KIDNEY DISEASE (CKD), SUB CLICNICAL HYPOTHYROIDISM, CLINICAL HYPOTHYROIDISM.

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 (GFR).[1]

Chronic kidney disease (CKD) is a clinical syndrome due to irreversible renal dysfunction leading to excretory, metabolic & synthetic failure culminating into accumulation of non-protein nitrogenous substances and present with various clinical manifestations.[2,3]

End stage renal disease is described as a terminal stage of chronic kidney disease that without replacement therapy would result in death. Despite various etiologies, CKD is final common pathway of irreversible destruction of nephrons ultimately resulting in alteration of Mileu interior that affects every system in body. Since kidney competes with iodide clearance, Thyroid hormonal system is affected.

Patients with CKD have many signs and symptoms suggestive of thyroid dysfunction like dry skin, cold intolerance, asthenia, hyporeflexia and decreased BMR .so in CKD cases it is difficult to exclude thyroid dysfunction on mere clinical background.[4,5]

Various studies have been conducted on thyroid function in CKD patients. since the beginning, the results were inconsistent ,hyperthyroidism, hypothyroidism & euthyroidism all have been reported. [6,7]

The relation between thyroid dysfunction & severity of CKD is not clear. Several previous studies debit conflicting results both positive and negative. Prevalance of hypothyroidism in end stage renal disease (ESRD) has been estimated between 0 & 9%.There is also increased prevalence of goiter in patients with ESRD. [8,9]

In view of variability of thyroid function test in patients with CKD in previous studies,

A prospective clinical and biochemical study on thyroid function in CKD patients in the Department of general medicine attached to Kamineni institute of medical sciences, Narketpally has been undertaken.

AIM:

1. To evaluate thyroid function in patients with chronic kidney disease.

OBJECTIVES:

1. To study the prevalence of thyroid dysfunction in patients with chronic Kidney disease.
2. To study the correlation between thyroid dysfunction and severity of renal diseases.

PATIENTS AND METHODS:

Place Of Study:
Department of General Medicine, Kamineni Institute of Medical Sciences, Narketpally, District- Nalgonda.

Study Design: Cross sectional study

Duration Of Study:
2 years (i.e. October 2018 to September 2020).

Sample Size: 50

Selection Of Study Subjects:
All the consenting patients with chronic kidney disease of varied etiology of both the genders and age groups(18-70) attending the General medicine OPD of KIMS hospital, Narketpally from the time period of October 2018 to September 2020 were selected for the study. Statistical parameters mean, standard deviation (SD) and correlations are used and parametric and non parametric tests are used for the analysis. Informed consent was obtained from all the patients.

Inclusion Criteria:
Patients with chronic kidney disease

Patients who fulfill the criteria for CKD and who are on conservative management.

Criteria For Chronic Kidney Disease

1. Symptoms of uremia for 3 months or more
2. Elevated blood urea, serum creatinine and decreased creatinine clearance
3. Ultra sound evidence of chronic kidney disease

a) Bilateral contracted kidneys — size less than 8 cm in male and size less than 7 cm in female
b) Poor corticomedullary differentiation
c) Type 2 or 3 renal parenchymal changes

4. Supportive laboratory evidence of CKD like anemia, low specific gravity, changes in serum electrolytes.

EXCLUSION CRITERIA:

1. Patients on peritoneal dialysis or hemodialysis
2. Nephrogenic range of proteinuria
3. Low serum protein especially albumin
4. Other conditions like

a) Acute illness
b) Diabetes mellitus
c) Liver diseases
d) Drugs altering thyroid profile like amiodarone, steroids, phenytoin, beta-blocker, estrogen pills, and iodine-containing drugs.

Details clinical history and clinical examination is undertaken with preference to thyroid and renal diseases. Thyroid profile was sent in all patients

Components of thyroid profile in this study

- Serum triiodothyronine(T3)
- Serum thyroxine(T4)
- Serum thyroid stimulating hormone (TSH)

Quantitative determination of T3, T4, and TSH is done by Enzyme Linked Immunosorbent Assay.

The normal values:
Total T3 ..... 0.6 to 2.1 ng/ml
Total T4 ..... 5 to 13 micro g/dl
TSH..... 0.4 to 7 micro IU/ml

Ethics Approval:

The study was approved by Institutional Ethics Committee, KIMS, Narketpally.

Data Analysis:

- Proforma was used to record the information.
- Data was tabulated in Microsoft Excel 2010 Worksheet.
- Data analysis was done using IBM SPSS 19.0 (Chicago, IL, USA).
- Fisher's exact test was used for statistical analysis

RESULTS AND DISCUSSION:

50 patients with Chronic Kidney Disease (CKD) fulfilling the criteria for CKD who were on conservative management were studied and following results were made.

Table-1: Age Wise Distribution Of Patients(n=50)

AGE GROUP(In years)	NO OF CASES	PERCENTAGE (%)
18 – 30	10	20
31- 60	35	70
>60	5	10
Total	50	100

Out of total 50 cases that qualified inclusion criteria 10 patients were below 30yrs,35 patients were in 31 to 60 yrs age group & 5 patients fall in >60 yrs group.

Table-2: Gender Wise Distribution Of Patients (n=50)

GENDER	NO. OF PATIENTS	PERCENTAGE (%)
MALE	30	60
FEMALE	20	40
TOTAL	50	100

Among all 50 cases in cases in our study 30 were males & 20 were females.

Table-3: Analysis Of Thyroid Abnormalities In Patients With Chronic Kidney Disease (N=50)

Thyroid Function	No.of Patients	Percentage (%)
SUB CLINICAL HYPOTHYROIDISM	17	34
OVERT HYPOTHYROIDISM	10	20
EUTHYROID	23	46
TOTAL	50	100

In our study, 50 patients of chronic kidney disease who are on conservative management & fulfilling the inclusion criteria were studied, most of the patients are euthyroid amounting to 46% of total cases, 34% cases have subclinical hypothyroidism, 20% cases had overt hypothyroidism.

Table-4: Gender Wise Distribution Of Thyroid Dysfunction (n=27)

Thyroid Dysfunction	MALE	FEMALE	TOTAL
SUB CLINICAL HYPOTHYROIDISM	10	7	17
OVERT HYPOTHYROIDISM	4	6	10

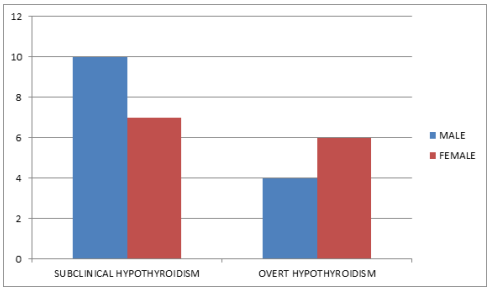

Figure-1: Gender Wise Distribution Of Thyroid Dysfunction (n=27)

- Among the males 10 had subclinical hypothyroidism, 4 had overt hypothyroidism, while in females corresponding numbers were 7 and 6, respectively.

Table-5: Distribution Of Cases Based On Creatinine Clearance (Cockcroft & Gault Equation)

CKD STAGES	CREATININE CLEARANCE (ml/min/1.73m2)	Cases (n=50)
1	≥90	0
2	60-89	4
3a	45-59	4
3b	30-44	5
4	15-29	11
5	<15	26

Table 5 shows that out of total 50 CKD patients 4 are each in CKD stage 2 & 3a , 5 were in stage 3b , 11 patients were in stage 4 , 26 patients were in stage 5 CKD.

Table-6: Correlation Of Patients With Thyroid Dysfunction With GFR & Stage Of CKD

CKD staging	Subclinical hypothyroidism (n=17),n (%)	Clinical hypothyroidism (n=10), n(%)	Total (n=27), n(%)
2	1(5.9)	1(10)	2(3.7)
3a	1(5.9)	1(10)	2(3.7)
3b	3(17.7)	2(20)	5(9.4)
4	4(23.5)	2(20)	6(11.3)
5	8(47)	4(40)	12(22.6)
Total	17(100.00)	10(100.00)	27(100.00)

From above table 6 , it's clear that, There were 17 CKD patients with SCH, 1 patient (5.9%) in Stage II CKD, 1 patient (5.9%) in Stage IIIA, 3 patients (17.70%) had Stage IIIB, 4 patients (23.50%) had Stage IV, and 8 patients (47%) had Stage V CKD. There were 10 CKD patients with overt hypothyroidism, of which 1 patient (10%) had Stage II CKD, 1 patient (10%) had Stage IIIA, 2 patients (20%) had Stage IIIB, 2 patients (20%) had Stage IV, and 4 patients (40%) had CKD Stage V.

Majority of CKD patients in the study (n= 27, 54%) showed abnormality in their serum thyroid function results. Seventeen (34%) participants had Sub clinical hypothyroidism (i.e., TSH values >5 mIU/L with normal FT4 levels), whereas 20% (n = 10) had clinical hypothyroidism (i.e., TSH >5 mIU/L with low FT4 [< 0.8 ngml] levels). The mean values of patients creatinine clearance, serum TSH and FT4 concentrations of sub clinical hypothyroidism were 21.66 ±16.72/ml/min/1.73m^2 , 8.22 ± 0.69 mIU/Land 10.89 ± 1.11 ng/dL, and in clinical hypothyroidism, the corresponding values were 24.55 ± 14.42 mL/min/1.73 m2 , 8.54 ± 0.89 mIU/L, and 13.49 ± 1.35 ng/dL, respectively.

DISCUSSION:

Majority of hormonal systems in body are affected by CKD. Patients with CKD most often show signs and symptoms suggestive of thyroid abnormality and hence the diagnosis of thyroid dysfunction in these patients has a prognostic value. Thyroid autoimmunity and subclinical primary hypothyroidism are prevalent in CKD patients not requiring long-term dialysis treatment.[10] The present study aims to assess the prevalence of thyroid abnormalities in CKD patients and to determine the correlation between thyroid dysfunction and severity of renal disease.

The association of thyroid abnormalities in CKD patients has been variable according to studies conducted previously. In our study, CKD patients only on conservative management were included because thyroid profile is altered due to hemodialysis. In a study by Chandra., SCH and clinically overt hypothyroidism have been reported to occur in ~40% and 16% of patients, respectively, with CKD not requiring renal replacement therapy[11] This study differ from observations made by previous studies by demonstrating a prevalence of SCH(34%) and clinical hypothyroidism(20%). There is an increased prevalence of subclinical and clinical primary hypothyroidism in persons with reduced estimated GFR (eGFR) independent of age and gender was observed in this study. This is in line with the observation made by Chonchol et al. [12] Our study included 50 cases of CKD, out of which 27 cases were having thyroid dysfunction in which 10 patients had clinical hypothyroidism and 17 patients had SCH. In this study, the absolute prevalence of hypothyroidism in the lower GFRs was higher than that reported in other studies, which may be due to the smaller sample size in the present study. Most of the patients in this study were in CKD Stage IV/V, which might be due to the fact that majority of the patients with CKD are referred to this tertiary care center had a low GFR.

Higher TSH levels are seen with increasing age.[13] The mean age in this study was 40.00 ± 12.26 and 48.5 ± 14.47 years in SCH and clinical hypothyroidism groups, respectively. As shown in Table 2, of 50 patients of CKD, 10 were clinically hypothyroid having the maximum percentage in Stage V (40%), while in Stage II, they had the lowest prevalence of hypothyroidism (10%). Lo et al. found that the prevalence of hypothyroidism increased with fall in GFR occurring in 5.4% of patients with GFR ≥90, 10.9% with GFR 60–89, 20.4% with GFR 45–59, 23.0% with GFR 30–44, and 23.1% with GFR < 0.001 for trend).[14] Prevalence of SCH increases with fall in GFR, Stage V (47%) and Stage II (5.9%). Among 50 CKD patients who were studied, 27 patients were found to have thyroid dysfunction. The overall prevalence of SCH in CKD in this study was 34% and it is higher than that observed in previous studies probably because of low sample size. In an previous study published in 2008, among 3089 adult participants, 293 (9.5%) had subclinical primary hypothyroidism and 277 (9%) had an eGFR <60mL/min/1.73 m2. [12]

Even though numerous hypotheses exist for contributing factors, such as altered iodine metabolism, reduced peripheral sensitivity to hormones, and autoimmune thyroiditis, the exact mechanism linking advanced CKD and primary thyroid dysfunction remain unclear.[12] To summarize, our study showed a higher prevalence of SCH and clinical hypothyroidism in patients of CKD. The severity of thyroid dysfunction increases with an increase in CKD staging.

CONCLUSION:

In this study it is found that reduced eGFR is associated with an increased prevalence of SCH and clinically overt hypothyroidism. In our study population of 50 CKD patients who were on conservative management for CKD, Among them, 54% of patients showed thyroid dysfunction. The most common thyroid disorder was SCH (34%) followed by clinical hypothyroidism (20%), which was higher than that has been reported previously. The severity of thyroid dysfunction increases with progressive fall in GFR. However physicians treating patients with CKD should be aware that CKD and hypothyroidism may shows overlapping symptom complexes. However Hyperthyroidism that was found in some previous studies was not found in this study.

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