



ORIGINAL RESEARCH PAPER

General Medicine

EVALUATION OF THYROID FUNCTION IN CHRONIC KIDNEY DISEASE PATIENTS

KEY WORDS: CKD, TSH, Thyroid profile, USG, KDOQI

Dr. Nitish Sharma*

Post-Graduate Resident*Corresponding Author

Dr. Ashis Kumar Sinha

Post-Graduate Resident

ABSTRACT

Chronic kidney disease (CKD), also called chronic kidney failure includes conditions characterized by a gradual loss of kidney function over time . When chronic kidney disease reaches an advanced stage, dangerous levels of fluid , electrolytes and wastes build up in blood and produces complications such as high blood pressure , anemia , weak bones , poor nutritional health , nerve damage , heart and blood vessel disease . Epidemiologic studies have found that predialysis patients with chronic kidney disease had an increased risk of hypothyroidism . Many cases were subclinical. CKD patients also have increased incidence of primary hypothyroidism and subclinical hypothyroidism. This study aims to delineate changes in thyroid profile produced by long-term kidney dysfunction in CKD patients.

INTRODUCTION

Chronic kidney disease (CKD), also called chronic kidney failure includes conditions characterized by a gradual loss of kidney function over time . When chronic kidney disease reaches an advanced stage, dangerous levels of fluid , electrolytes and wastes build up in blood and produces complications such as high blood pressure , anemia , weak bones , poor nutritional health , nerve damage , heart and blood vessel disease . These problems might happen slowly over a long period. When kidney disease progresses, it might eventually lead to kidney failure, which requires dialysis or a kidney transplant to maintain life (1). A study conducted by Harvard Medical School in partnership with 13 medical centers all over India found that 17 % Indians had some form of chronic kidney disease (8), Commonest causes of CKD were Diabetes , Hypertension , Glomerulonephritis, Interstitial nephritis, Polycystic kidney disease , Prolonged obstruction of the urinary tract from conditions such as enlarged prostate , kidney stones and some cancers, Vesicoureteral reflux , Recurrent kidney infection (pyelonephritis)⁽⁹⁾.

The thyroid gland regulates majority of the body's physiological actions . The thyroid produces hormones (T3 and T4) that have many actions including metabolism , development , protein synthesis , and the regulation of many other important hormones . Any dysfunction in the thyroid can affect the production of thyroid hormones (T3 and T4) which can be linked to various pathologies throughout the body ⁽¹⁰⁾.

Epidemiologic study found that predialysis patients with chronic kidney disease had an increased risk of hypothyroidism . Many cases were subclinical (12,13). CKD patients also have increased incidence of primary hypothyroidism and subclinical hypothyroidism (14) . The low T3 levels (especially total T3 and not free T3) in CKD patients have been correlated with higher levels of markers of inflammation [highly sensitive C - reactive protein (hsCRP) , IL - 6 , etc.) , malnutrition (lower prealbumin , IGF 1) , increased endothelial dysfunction , poorer cardiac function , poor survival , and higher all - cause as well as cardiovascular mortality in some studies (15,16). With the aim of evaluating the prevalence of thyroid dysfunction in chronic kidney disease and correlation with severity of chronic kidney disease current study has been planned in tertiary care center of Hapur.

MATERIALS AND METHODS

Study Setting: Department of General Medicine, Rama Medical College and Hospital, Hapur, taken as cases in the study.

Study Design: Prospective Observational Study.

Study Population: Chronic Kidney Disease (CKD) patients, who were attending OPD & IPD and admit in Rama Medical College and Hospital, Hapur.

Sample Size: Purposive selection of 104 CKD patients within 1 year 10 months.

Study tools: Pre - designed semi - structured questionnaire.

Study Periods:

Data collection period November 2020 to August 2022
Data collected for a period of 1 year and 10 month.

Sampling Technique: Convenient sampling used

Participant Enrolment:

Inclusion criteria:

- Patients with CKD patients who fulfil criteria for CKD and who were on conservative management (not on dialysis).

Exclusion criteria: Patient on hemodialysis

- Recent surgery or trauma
- Liver disease
- Drugs altering thyroid profile like amiodarone, steroids, dopamine, phenytoin , beta - blocker, estrogen pills, iodine - containing drugs.
- Pregnancy
- Nephrotic range of proteinuria
- Low serum protein especially albumin
- CKD patients who have received renal transplant .

Consent:

- >18 years Patient's consent
- <18 years Parents or Guardian's consent

Criteria for CKD:

- Elevated Blood Urea, Serum Creatinine and decreased creatinine clearance (CrCl < 30ml / min)
- Ultra sound evidence of chronic kidney disease
- Bilateral contracted kidney -size less than 8 cm.
- Poor Cortico - medullary differentiation.
- Supportive laboratory evidence of CKD like anemia , changes in serum electrolytes , radiological evidence of renal Osteodystrophy etc.

OBSERVATION

In the present study, mean age of the patients was 39.4 +14.0 years with minimum age 16 years and maximum age 75 years. Majority of the patients were ≤ 30 years (30.8 %) and 31-40

years old (30.8 %), followed by 41-50 years old (19.2 %), 51-60 years old (13.5 %) and more than 60 years old (5.8 %).

Around three - fifths of the patients (59.6 %) were males (n = 62) and around 40.4 % patients were female (n = 42) with male-female ratio of 1.5:1.

Among male patients (n -62), majority of the patients were ≤ 30 years old (35.5 %), followed by 31 - 40 years old (19.4 %), 41-50 years old (19.4 %), 51-60 years old (16.1%) and more than 60 years old (9.7%). However , among female patients (n =42), majority of the patients were 31-40 years old (47.6 %) , followed by ≤30 years old (23.8 %) , 41-50 years old (19 %) and 51- 60 years old (9.5 %).

Ultra - sonography (USG) performed in all chronic kidney disease patients and all patients (100 %) had bilateral contracted kidney.

More than half of the chronic kidney disease patients (53.8 %) had signs of hypothyroidism (n =56). While 46.2 % patients had no signs of hypothyroidism (n =48).

Among CKD patients with positive hypothyroidism signs (n - 56) , majority of the patients were 31 40 years old (32.1 %) , followed by ≤ 30 years old (28.6 %) , 51-60 years old (21.4 %) , 41-50 years old (14.3 %) and more than 60 years old (3.6 %) . However , CKD patients with no signs of hypothyroidism (n - 48) , majority of the patients were ≤ 30 years old (33.3 %) , followed by 31-40 years old (29.2 %) . 41-50 years old (25 %), 51-60 years old (4.2 %) and more than 60 years old (8.3%). By applying chi square test, the relationship of age with the presence of signs of hypothyroidism was non - significant (p > 0.05).

Among CKD patients with positive hypothyroidism signs (n = 56) , more than three - fifth of the patients were male (60.7 %) , while 39.3 % patients were female . 48 Among CKD patients with negative hypothyroidism signs (n=48) , majority of the patients were also male (58.3 %) , while 41.7 % patients were female . By applying chi square test , the relationship of gender with the presence of signs of hypothyroidism was non - significant (p > 0.05) . Majority of the patients (30.8 %) suffering from chronic kidney disease for 13-18 months , 26.9 % patients suffering from CKD for 6- 12 months , 23.1 % patients suffering from CKD for more than 24 months and around 19.2 % patients suffering from CKD for 19-24 months . Mean level of free T3 hormone among all patients was 1.32 + 0.57 ng / mL with minimum level 0.01 ng / mL and maximum level 2.59 ng / mL . Mean level of free T4 hormone among all patients was 1.22 ± 1.12 µg / dL with minimum level of 0.32 µg / dL and maximum level of 8.63 µg / dL . However , mean level of Thyroid Stimulating Hormone (TSH) among all patients was 3.93 + 1.3 µUI / mL with minimum level of 0.05 µUI / mL and maximum level of 6.18 µUI / mL. Among all CKD patients in the study, normal level of T3 hormone (0.5 - 1.85 ng / mL) was present in 73.1 % patients (n - 76), while 3.8 % patients had below normal level of T3 hormone (< 0.5 ng / mL) and 23.1 % patients had above normal level (> 1.85 ng/ mL) . Out of all CKD patients in the study, normal level of T4 hormone was present in only one patient (1.9 %) , while in remaining 98.1 % patients had below normal level of T4 hormone (M :< 4.4 µg/dL, F :< 4.8 µg/dL). Out of all CKD patients in the study, normal level of TSH hormone (0.28 -6.82 uUI / mL) were present in 98.1 % patients (n =102) , while in remaining 2 patient had below normal level of TSH hormone (< 0.28 uUI /mL).

RESULTS

A prospective observational study conducted in CKD patients done diagnosing in thyroid dysfunction. Male was more commonly affected comparing to females. Hypothyroidism sign was present in 53.8 % CKD, however relationship of age and gender with the presence of signs of hypothyroidism was

non - significant (p > 0.05). Among all CKD patients, 3.8 % patients had below normal level of T3 hormone and 23.1 % patients had above normal level, while 98.1 % patients had below normal level of T4 hormone. However, 98.1 % CKD patients had normal level of TSH hormone, many other studies.

Present study had concluded that chronic kidney disease patients had abnormality in thyroid hormone mainly lowering of the T4 and T3 hormones but TSH hormone level remain within normal limits.

DECLARATION:

The author has no conflicts of interest to declare.

REFERENCES:

1. About Chronic Kidney Disease (Internet). National Kidney Foundation. 2017 [cited from:2018 Jan 9].P.31
2. Jha V, Garcia - Garcia G, Iseki K, Li Z, Naicker S, Plattner B, et al . Chronic kidney disease : global dimension and perspectives .Lancet. 2013,382 (9888) :260-72 .
3. Grassmann A, Gioberge S, Moeller S, Brown G. ESRD patients in 2004: global overview of patient numbers, treatment modalities and associated trends. *Nephrol Dial Transplant*. 2005; 20 (12):2587-93.
4. O'Hare AM, Choi AI, Bertenthal D, Bacchetti P, Garg AX, Kaufman JS, et al . Age affects outcomes in chronic kidney disease. *J Am Soc Nephrol*. 2007; 18 (10): 2758-65.
5. Agarwal SK, Dash SC, Irshad M, Raju S, Singh R, Pandey RM. Prevalence of chronic renal failure in adults in Delhi , India . *Nephrol Dial Transplant*. 2005; 20 (8): 1638-42.
6. Mani MK. Prevention of chronic renal failure at the community level. *Kidney Int*. 2003; 63:S86-9.
7. Mani MK. Experience with a program for prevention of chronic renal failure in India. *Kidney Int*. 2005; 67:S75-8.
8. Dr. Prashant C. Dheerendra . Some Devastating Statistics About Chronic Kidney Failure in India [Internet]. *Practo* . 2016 [cited 2018 Jan 9]. p. 1-6.
9. Chronic kidney disease [Internet]. *Mayo Clinic*. 2017 [cited 2018 Jan 9]. p. 1-6.
10. Mohamedali M, Reddy Maddika S , Vyas A , Iyer V. Cheriya P Thyroid disorders and chronic kidney disease. *Int J Nephrol*. 2014; 2014
11. Palmer BF, Henrich WL Thyroid function in chronic kidney disease [Internet] . *UpToDate* . 2017 [cited 2018 Jan 10] . p. 1-3.
12. Lo JC, Chertow GM, Go AS, Hsu C -Y. Increased prevalence of subclinical and clinical hypothyroidism in persons with chronic kidney disease . *Kidney Int* . 2005; 67 (3) :1047-52.
13. Chonchol M , Lippi G , Salvagno G , Zoppini G, Muggeo M, Targher G. Prevalence of subclinical hypothyroidism in patients with chronic kidney disease. *Clin J Am Soc Nephrol*. 2008; 3 (5): 1296-300.
14. Basu G, Mohapatra A. Interactions between thyroid disorders and kidney disease. *Indian J Endocrinol Metab* [Internet]. 2012; 16 (2):204-13.