



STUDY OF THYROID PROFILE IN PATIENTS OF CKD (STAGE II-IV)

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ABSTRACT

Chronic kidney disease (CKD) is a growing public health concern. Metabolism of thyroid hormones gets impaired in the patients of CKD and thus, results in signs and symptoms associated with thyroid disorder.

This was a cross sectional descriptive study carried out in the outpatient and inpatient department of General Medicine, Mahatma Gandhi Mission Hospital, Navi Mumbai from March 2020 to October 2021. Ethics approval was obtained from Institutional ethics committee. Appropriate statistical tests were applied and a p value of <0.05 was considered to be statistically significant. Males constituted 82.3% of study population and 44.4% of patients were in the age group of 51 to 60 years. Around one-half of patients had duration of CKD of more than 1 year. Abnormal thyroid profile was found in the 48.9% of CKD patients out of which, 28.9% had subclinical hypothyroidism and 20% had overt hypothyroidism. The association between duration of CKD, gender and thyroid status was found to be statistically significant ($p < 0.05$). The study also showed raised TSH level was seen in 56% of study population.

KEYWORDS :Chronic Kidney disease (CKD), Thyroid hormones, Hypothyroidism, Euthyroid, TSH

INTRODUCTION

The prevalence of chronic kidney disease (CKD) is a growing global public health concern. The Global Burden of Disease study estimated about 1.4 million deaths globally from CKD in 2019, a 20% increase from 2010, one of the largest surges among the top causes of death.

There are various causes and risk factors which also lead to progressive decline in eGFR. One of the important risk factor which is correlated with the severity of CKD is circulating thyroid hormones in the blood. CKD impairs metabolism of thyroid hormones which results in abnormalities associated with thyroid hormones imbalance, manifesting with signs and symptoms of thyroid disorder. Few studies have shown that high prevalence of hypothyroidism has been seen in CKD patients and its progression.

Present study was conducted to assess the level of thyroid profile in patients of CKD not undergoing dialysis to establish correlation of thyroid profile with severity of CKD patients.

MATERIALS AND METHODS

The aim of the present study was to assess thyroid profile in patients of CKD from stage II to IV who were not undergoing hemodialysis at the time of study. The objectives for present study were to describe thyroid profile in the CKD patients and their correlation with CKD. Apart from this, the study also planned to estimate serum creatinine and eGFR (using 4-variable MDRD formula) in these patients.

The present study was a descriptive cross-sectional study which was carried out in the outpatient (OPD) and in-patient (IPD) departments of Department of General Medicine, Mahatma Gandhi Mission Hospital, Navi Mumbai. The study lasted for 20 months from March 2020 to October 2021. Sample size was found to be 45 and the inclusion criteria for participation in the study was adults (>18 years and above) diagnosed with CKD, stage II-IV as per KDIGO 2012 and not undergoing hemodialysis. Exclusion criteria included patients with CKD on hemodialysis, organ transplant recipients, past history of malignancy, on steroids, pregnant women, patients with visible goiter and not giving consent to

be part of the study. Prior to the start of the study, ethical approval was obtained from institutional ethics committee.

Investigations done in the study were thyroid profile (using automated analyser Cobas e411) and estimation of GFR by using MDRD (Modification of Diet in Renal disease) formula. Body mass index was calculated by using anthropometric examination performed.

The criteria used for defining chronic kidney disease (CKD) was as defined by The National Kidney Foundation (Kidney Dialysis Outcomes Quality) which were as follows:

- Presence of uremic symptoms (fatigue, cognitive dysfunction, unexplained weight loss, loss of appetite, muscle cramps, itching, nausea, vomiting) for 3 months or more
- Raised blood urea, serum creatinine, and reduced creatinine clearance
- Ultrasonogram evidence of chronic kidney disease – bilateral contracted kidney less than 9cm and poor cortico-medullary differentiation.

RESULTS

Table 1 Age-wise Distribution Of Study Population

Age group (in years)	Frequency (n)	Percentage (%)
21-30	1	2.2
31-40	11	24.4
41-50	3	6.7
51-60	20	44.4
61-70	9	20
≥ 71	1	2.2
Total	45	100

Table 1 shows the age distribution of study population. In our study, around 45% of participants belonged to age group of 51 to 60 years followed by patients belonging to the age group of 31 to 40 years which constituted approximately 25% of sample size.

Table 2 Gender Distribution Of Study Population

Gender	Frequency (n)	Percentage (%)
Males	37	82.3

Females	8	17.7
Total	45	100

Table 2 shows the gender distribution of study population. Males constituted 82.3% of sample size while females' patients were 17.7% of study sample size.

Table 3 Duration Of Kidney Disease In The Study Population

Duration of CKD	Frequency (n)	Percentage (%)
≤ 6 months	9	20
6 months to 1 year	13	28.9
> 1 year	23	51.1
Total	45	100

In our study, around one-half of patients (51.1%) had duration of CKD of more than 1 year. In 28.9% of patients, duration of CKD was in between 6 months to 1 year while remaining 20% patients had duration of less than 6 months. (Table 3)

Table 4 Association between thyroid profile and gender in the study population

Gender	Thyroid Status		
	Euthyroid n (%)	Subclinical Hypothyroidism n (%)	Overt Hypothyroidism n (%)
Males	20 (54)	08 (21.7)	09 (24.3)
Females	03 (37.5)	05 (63.5)	00 (0)
Total	23	13	09
χ ² , p value	5.178, 0.05		

Table 4 shows the association between thyroid profile among CKD patients and gender. Among males, majority of patients (54%) were euthyroid while in case of females, 63.5% were suffering from subclinical hypothyroidism. The association between gender and thyroid profile was found to be statistically significant (p = 0.05).

Table 5 Correlation of Duration of CKD with thyroid profile

Thyroid Profile	Duration of CKD		
	≤6 months n (%)	6 months to 1 year n (%)	> 1 year n (%)
Euthyroid	07 (77.8)	04 (30.8)	12 (52.2)
Subclinical hypothyroidism	01 (11.1)	03 (23.1)	09 (39.1)
Overt Hypothyroidism	01 (11.1)	06 (46.2)	02 (8.7)
Total	23	13	09
2, p value	10.55, 0.03		

Table 5 shows the correlation between thyroid profile with duration of CKD in patients. Among patients with duration of CKD of less than 6 months, around three-fourth (77.8%) of patients were euthyroid while in patient with duration of CKD of 6 months to 1 years, 46.2% of patients had overt hypothyroidism. In case of patients of CKD with duration of more than 1 year, 52.2% of patients had euthyroid. The correlation was found to be statistically significant (p = 0.03).

Table 6 Correlation of mean serum creatinine with respect to age and gender in CKD patients

Variables		Mean Serum Creatinine (mg/dl)	p-value
Age	21-30	1.7	0.542
	31-40	2.5	
	41-50	1.6	
	51-60	2.2	
	61-70	2.3	
	≥ 71	3.2	
Gender	Males	2.3	0.740
	Females	2.2	

Table 6 shows the correlation of mean serum creatinine with age and gender and it was found that the correlation between mean serum creatinine and age or gender was not found to be statistically significant. (0.542 and 0.74)

DISCUSSION

Mean body mass index (BMI) was found to be 23.87 kg/m² with standard deviation of 3.5 kg/m². Majority of patients in our study had normal BMI. In a study by Herrington W et al, they found the mean BMI of patients with CKD to be 27.4 kg/m² and concluded that obesity and overweight proportionately increases the risk of advanced CKD. A high body mass index is one of the strongest risk factors for new-onset CKD. In obese individuals, a compensatory hyper-filtration occurs to meet the increased metabolic demands of the increased body weight.

In our study, majority of the patients had hypertension (38.8%), followed by diabetes (25.4%) and obesity (20.9%). This correlates with studies done by Khatiwada S et al and Herrington WG et al. Kamal NM et al studied 150 patients and found a significant correlation of higher preponderance of hypertension and diabetes in CKD patients.

The mean eGFR in our study population was 38.4 ±15.7 mL/min/1.73m². Classification of CKD into different stages in the study was done as per National Kidney Foundation guidelines, with eGFR using the 4-variable MDRD formula. O'Hare et al reported that the majority of the patients had stage 3 CKD (estimated glomerular filtration rate [eGFR] 30 to 59 ml/min/ 1.73 m²) rather than stage 4 CKD (eGFR 15 to 29 ml/min per 1.73 m²) or end stage renal disease (eGFR < 15 ml/min/1.73 m²).

Abnormal thyroid profile was found in 48.9% of CKD patients, out of which 28.9% had subclinical hypothyroidism while, 20% had overt hypothyroidism. However, 51.1% of study population were in euthyroid state. Asif M et al reported that, 41.5% had subclinical hypothyroidism while 12.3% had overt hypothyroidism. Khatiwada S et al found 27.2% patients had subclinical hypothyroidism followed by 8% of had overt hypothyroidism in CKD study population.

In our study, 26.7% patients had low T3 and 20% had low T4. Thyroid stimulating hormone level was raised in 35.6%. Punekar J et al, reported that, there was low T3 level in 53.33% and low T4 level in 30.67% patients of the study population. Thyroid stimulating hormone level was raised in 56% of study population.

Variables	Present study	Punekar J et al	Gowda M et al	Asif M et al
Low T3	26.7%	53.3%	48%	-
Low T4	20%	56%	22%	-
High TSH	35.6%	56%	10%	53.8%

CONCLUSION

It can be concluded from present study that reduced kidney function was associated with subclinical and clinical hypothyroidism and majority of CKD patients had normal thyroid profile levels. The study also showed a statistically significant correlation of eGFR and TSH levels.

One of the limitation of present study is that the sample size of the present study was small and findings of the present study could not be extrapolated to the general population. Another limitation of the present study was that it was a cross-sectional study and therefore, no follow-up was done, and no future thyroid profile of patients was assessed.

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