ORIGINAL RESEARCH PAPER

General Medicine

STUDY OF THYROID HORMONE PROFILE AS A PROGNOSTIC FACTOR IN CHRONIC KIDNEY DISEASE – A HOSPITAL BASED STUDY

KEY WORDS:

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ABSTRACT

Background

Chronic kidney disease (CKD), an inevitable terminal event of chronic renal parenchymal disease, due to various causes is known more for its morbidity than for its mortality. Patients with chronic renal failure often have signs & symptoms suggestive of thyroid dysfunction. Various studies of thyroid functions in uremic patients have been carried out which have shown conflicting results.

Aim

1.To study the prevalence of thyroid dysfunction in patients with chronic renal failure.
2.To study the correlation between thyroid dysfunction and severity of renal failure.
3.To differentiate primary thyroid diseases from thyroid dysfunction due to chronic renal failure.

Materials & Methods

It was a hospital-based study done on patient admitted and diagnosed with CKD in Jhalawar medical college, Jhalawar from Jan. 2021 to Nov. 2021. The history of the onset, progression, duration of various symptoms, drug and diet history was noted. Detailed clinical history and examination was undertaken with preference to thyroid and renal diseases. Laboratory investigations like basic blood profile, blood urea, serum creatinine, serum cholesterol, thyroid function test and ultrasound abdomen were done. **Results** In uremia the mean values of both serum T3 & T4 were significantly low. 3. Serum level of total T3 and free T4 is directly proportional to creatinine clearance level. There is a positive correlation between Total T3 and creatinine clearance & there is a positive correlation between Free T4 and creatinine clearance. **Conclusion** Prevalence of thyroid dysfunction in patients with CKD is 54%. Alteration in the values of T3 and T4 occurs as a part of body adaptation mechanism to conserve energy. Total T3 and free T4 had correlation with the severity of renal failure. TSH values will be useful to differentiate hypothyroidism from non- thyroidal illness due to CKD.

INTRODUCTION

Patients with chronic renal failure often have signs & symptoms suggestive of thyroid dysfunction. Various studies of thyroid functions in uremic patients have been carried out which have shown conflicting results. Hyperthyroidism, hypothyroidism & euthyroid state have all been reported by various workers. A reduction in total T3, but not in free T3 concentrations was associated with an increased all-cause and cardiovascular mortality in euthyroid CKD patients[1]. Prevalence of hypothyroidism in end stage renal disease (ESRD) have been estimated between 0 and 9%. There is also increased prevalence of goiter in patients with ESRD. Though there are multiple factors which predicts the overall mortality and severity of renal disease, one among the important factor is thyroid dysfunction.

MATERIALS AND METHOD

It was a hospital-based study done on patient admitted and diagnosed with CKD in Jhalawar medical college, Jhalawar from Jan. 2021 to Nov. 2021. Patients presenting to the hospital and diagnosed with CKD were included in the study after obtaining informed consent until 100 cases were collected. The history of the onset, progression, duration of various symptoms, drug and diet history was noted. Detailed clinical history and examination was undertaken with preference to thyroid and renal diseases. Laboratory investigations like basic blood profile, blood urea, serum creatinine, serum cholesterol, thyroid function test and ultrasound abdomen were done. All the data was compiled and analyzed by SPSS software.

RESULTS

Among the 100 patients included in this study 74% were male and 26% were females (Table 1). Duration of CRF in this study varied from 3 months to 1 year. Prevalence of thyroid dysfunction among the sexes is shown in the Table 2. The prevalence of low T3 syndrome was 54% (54 cases) and the low T4 syndrome was 22 % (22 cases). The prevalence of TSH in hypothyroidism range was 4 %(4 cases). Table 3 reveals the mean T3, free T4 and TSH levels in various stages of CKD. The mean T3 is decreased significantly with reduced creatinine clearance.

The free T4 is also significantly decreased in stage 5 CKD. Positive correlation between total T3 and creatinine clearance & Free T4 and creatinine clearance have been depicted in Table 4. Among the 100 patients 94(94%) patients had no evidence of goiter. With remaining 6 patients 4(4%) patients had exclusively goiter , 2 (2%)patients had goiter with pleural effusion .The total prevalence of goiter in our study is 6%.

Table 1: Sex Wise Age Distribution of Patients Taken For Study

Age group (in years)	Male		Female		Total	
	Frequency	%	Frequency	%	frequency	%
30-39	16	21.6	0	Nil	16	16
40-49	8	10.8	10	38.4	18	18
50-59	20	27	12	46.2	32	32
60-69	30	40.5	4	15.4	34	34
Total	74	100	26	100	100	100
Median age	55(35-69)		55(40-62)		55(35-69)	
Mean ± S.D.	53.8±11.8		51.5±7.2		52.7±10.3	
't'	0.486					
Significance	D.f.=48 P>0.05					

Table 2 : Sex Wise Prevalance of Thyroid Dysfunction In Ckd Patients

Thyroid Hormones	Level of hormone	No	Males, n=74		Females=13		't'	Significance
			Frequency	%	Frequency	%		
T3	Low	54	36	48.6	18	69.2	1.354	P>0.05
	Normal	46	38	51.4	8	30.8		
T4	Low	22	14	18.9	8	30.8	0.830	P>0.05
	Normal	78	60	81.1	18	69.2		
TSH	High	4	2	2.7	2	7.7	0.636	P>0.05
	Normal	96	72	97.3	24	92.3		

Table 3: Distribution of Total T3 Free T4 And Tsh In Various Stages of Ckd

Stages of CKD	Frequency	Mean Total T3	Mean Free T4	Mean TSH
1-3	10	103.4±30.7	1.25±0.1	1.8±1.9
4	32	91±36.6	1.1±0.2	1.2±0.8
5	58	68.8±24	0.9±0.3	4.5±13.7

Table 4: Relationship Between Creatinine Clearance With Total T3, Free T4 And Tsh

Relation with Cr.Clearance	R	Significance
Total T3	0.320	P<0.05
Free T4	0.381	P<0.01
TSH	-0.133	P>0.05

Table 5: Prevalance Of Goiter In Chronic Kidney Disease Patients

S.No.	Disease	No.	%
1	Goiter	4	4
2	Goiter with Pleural Effusion	2	2
3	No evidence	94	94

DISCUSSION

Patients with CRF often have signs & symptoms suggestive of thyroid dysfunction & hence the diagnosis of thyroid disease in these patients has obvious prognostic implications. In uremia the mean values of both serum T3 & T4 were significantly low. This is comparable to **Ramiraz et al.**[2] **and Lim VS et al.**[3] study. In our study, out of 100 patients 54 patients (54%) had low T3 syndrome. The prevalence of low T3 in stage 1- 3 is 20 %, for stage 4 is 38%, and stage 5 is 70%. This observation is consistent with **Sang Heon Song et al.**[4] in which the prevalence of low T3 will be increased according to the increase in stage of CKD. In our study there is a positive correlation between Total T3 and creatinine clearance and it is statistically significant P<0.05. This shows serum T3 levels were associated with severity of CKD even in the normal TSH level. There was higher frequency of reduced free T4 values in our study (22%) which is consistent with **Kaptein et al.**[5] **and Avasthi et al.**[6] study but it is not statistically significant. In our study there is a positive correlation between Free T4 and creatinine clearance and it is statistically significant P<0.05. **Ramirez et al.**[2] reported high prevalence of goiter in CRF patients especially those on chronic dialysis. Incidences were increased in end stage renal disease. The possible explanation is due to accumulation of iodides in thyroid gland due to decreased renal clearance in CRF patients. Study conducted by **Hegedus et al.**[7] showed thyroid gland volume was significantly increased in patients with CRF. In our study, 6(6%) patients had evidence of goiter. Out of 6 patients, 2(2%) had clinical and biochemical features of hypothyroidism. Remaining 2 patients had low T3 level with normal TSH and T4.

CONCLUSION

1. The prevalence of thyroid dysfunction in patients with CKD is 54%.
2. Number of patients with low T3 and T4 syndrome progressively increases with severity of renal failure.
3. Serum level of total T3 and free T4 is directly proportional to creatinine clearance level.
4. Total T3 and free T4 had correlation with the severity of renal failure.
5. TSH values will be useful to differentiate hypothyroidism from non- thyroidal illness due to CKD.
6. Only 6% of the study population had evidence of goiter.
7. Alteration in the values of T3 and T4 occurs as a part of body adaptation mechanism to conserve energy.

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