International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 6; Issue 12; December 2017; Page No. 7940-7943
DOI: http://dx.doi.org/10.24327/ijcar.2017.7943.1257

Research Article

STUDY OF HYPOTHYROIDISMIN CHRONIC KIDNEY DISEASE PATIENTS

Gangadhar B[1]., Hari Prasad[1]., Manjusha[2]., and Pradeep Deshpande[2]

Department of Nephrology, Gandhi Medical College & Hospital Secunderabad

ARTICLE INFO

Article History:
Received 15th September, 2017
Received in revised form 25th October, 2017
Accepted 23rd November, 2017
Published online 28th December, 2017

Key words:

Glomerular Filtration Rate, Thyroid Stimulating Hormone, Dialysis

ABSTRACT

The interactions between kidney and thyroid functions are known for years. Thyroid hormones (TH) influence kidney function both during embryonic development and in the mature functioning of the kidney. When the thyroid is either hyper- or hypo-functioning, changes in different clinical renal parameters occur. Vice versa, kidney disease influences circulating thyroid hormones. Aim of the study is to study the prevalance of hypothyroidism in CKD patients of varying stages.and to study the trend of prevalence as the renal impairement increases. The study was done in Gandhi Hospital, Secunderabad and Princess Esra hospital Hyderabad over a period of one year from December 2013-December 2014. 50 patients who have CKD Stage I to V.were chosen. They are adviced to get thyroid profile. Prevalence of hypothyroidism in chronic kidney disease patients is about 19%. Prevalence of hypothyroidism increases as the severity of the renal impairment increases. Its prevalence in CKD Stage IV, V patients is 18%, 31% respectively. Hypothyroidism is more common in female patients with CKD compared with males. Hypothyroidism is more common indiabetic patients with CKD compared with non-diabetic patients with CKD.

INTRODUCTION

The interactions between kidney and thyroid functions are known for years[1,2,3,4]. Thyroidhormones(TH) influence kidney function both during embryonic development and in the mature functioning of the kidney, indirectly by affecting the cardiovascular system through its influence on renal blood flow (RBF), and directly by affecting glomerular function,the tubular secretory and absorptive capacities, electrolytepumps and kidney structure (denHollander *et al*., 2005). When the thyroid is either hyper-orhypo-functioning, changes in different clinical renal parameters suchas glomerular filtrationrate (GFR), urinespecific gravity (USG), urinary protein/creatinine ratio (UPC) and markers of tubular function canoccur. Viceversa, kidney disease influences circulating thyroidhormones.

Aim of Thestudy

1. To study the prevalence of hypothyroidismin CKD patients of varying stages.
2. To study the trend of prevalence as the renal impairement increases

MATERIALS AND METHODS

The study was done in Gandhi Hospital, Secunderabad over a period of one year from December 2013-December 2014.50 patients were chosen.

Corresponding author:* **Hari Prasad
Department of Nephrology, Gandhi Medical College & Hospital Secunderabad

The patients detected to have CKD Stage I to V.

Exclusion Criteria

1. Women who are pregnant
2. Subjects who are receiving drugs that could contribute to hypothyroidism (lithium, amiodarone, oriodine)
3. Subjects receiving antithyroid drugs (methimazoleor propylthiouracil)

METHODS

Dignosed patients of chronic kidney disease from stage Itostage V are adviced to get thyroid profile done to know the prevalence of clinical and subclinical hypothyroidism in the study population.

Parameters under the Study

Thyroidprofile–Sr. TSH, Sr.T3, Sr.T4

Blood urea, Sr.creatinine

EGFR

Patients with chronic kidney disease confirmed by:

1. Ultrasonography of kidneys.
2. GFR was measured by MDRD equation :- EGFR (mL/min/1.73m2)= 186×(serum creatinine[mg/dL])$^{-1.154}$ ×(age)$^{\mathbf{-0.203}}$ × 0.742(if female) ×1.21(if African American)

We also exclude women who were pregnant (given potential pregnancy-related changes in thyroid function) and subjects who were receiving concurrent treatment with drugs that could contribute to hypothyroidism (amiodarone, oriodine). The

treatment taken by patients included iron salts, vitamins, calcium and furosamide (40-160 mg/day) when indicated; and anti-hypertensive agents as required. Each patient was interviewed. Duration of CKD was reviewed carefully. Investigations (blood urea, serumcreatinine, totalT3, totalT4, TSH) were done.

The normal reference range for TSH-- 0.35to5.5µIU/ml, The normal reference range for total T4--4.5 to 10.9µg/dL, The normal reference range for total T3–0.60 to1.81ng/ml.

Hypothyroidism was defined as a TSH level >5.5 m IU/ml or treatment with thyroid hormone (levothyroxine). Both subclinical and clinical hypothyroid cases included. Method of testing is by chemiluminescence immune assay (CLIA) in standard lab.

Statistical analysis

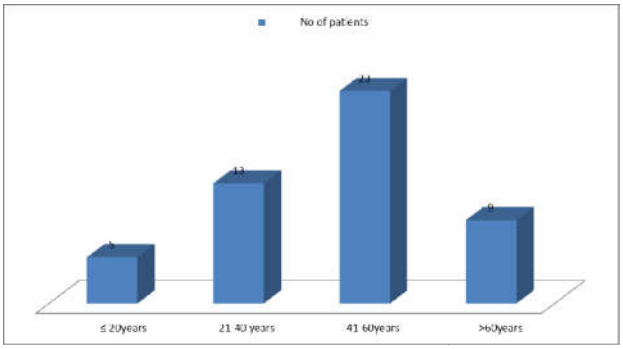
Statistical analysis was performed using the Graph PadInStat software version 3.10 for Windows. Data are expressed as mean+/- SD. The Fisher's exact test was used for comparison of categorical variables. Student's unpaired t-test was used to compare continuous variables. Statistical significance was set at P<0.05

RESULTS

A total of 50 patients of Chronic Kidney disease of various stages were studied. Of the 50 patients studied, 31 were males and 19 were females. Age distribution of the patients given below.

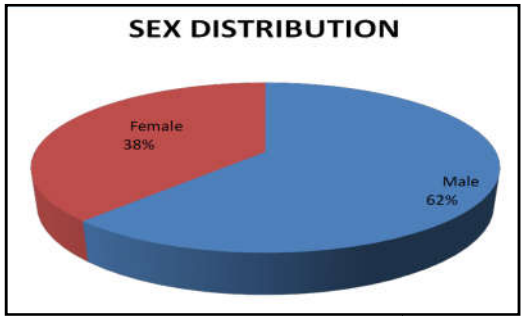
Age distribution of the patients studied

Age Range	No of patients	% o fpatients
≤ 20years	5	10%
21-40years	13	26%
41-60years	23	46%
>60years	9	18%



Sex distribution of the patients studied

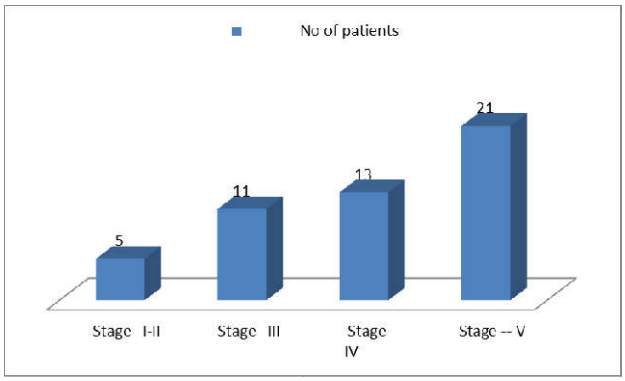
Sex	No of patients	% of patients
Male	31	62
Female	19	38
Total	50	100



Out of the 50 patients studied 19 were female (38%), 31 were male (62%).

Distribution according to stage of CKD

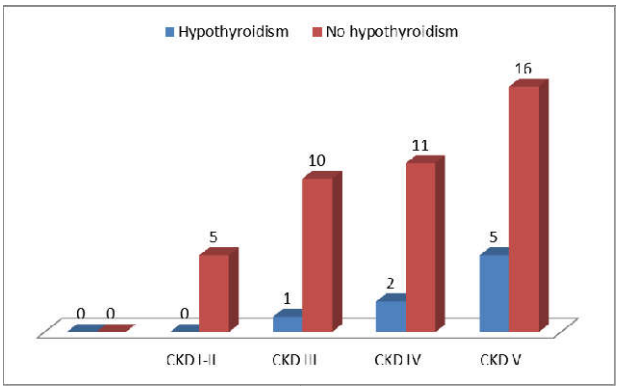
CKD Stage	No of patients	% of patients
Stage–I-II	5	10
Stage–III	11	22
Stage–IV	13	26
Stage-- V	21	42



Of all patients, 5 are from CKD stage Ior II, 11 from CKD stage III,13 from CKD stageIV, 21 from CKD stageV. Of the 21 patients with CKD stage V, 17 are on maintanence hemodialysis and the remaining are on conservative management.

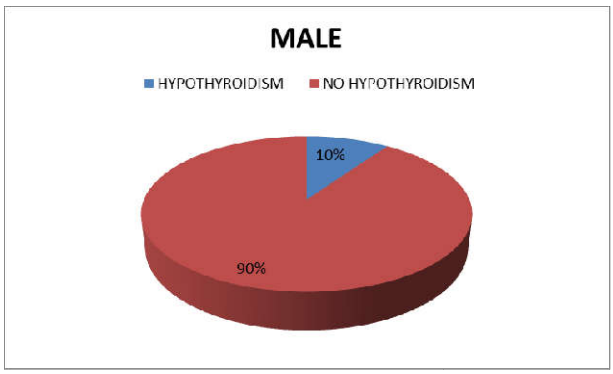
Hypothyroidism according to CKD Stages

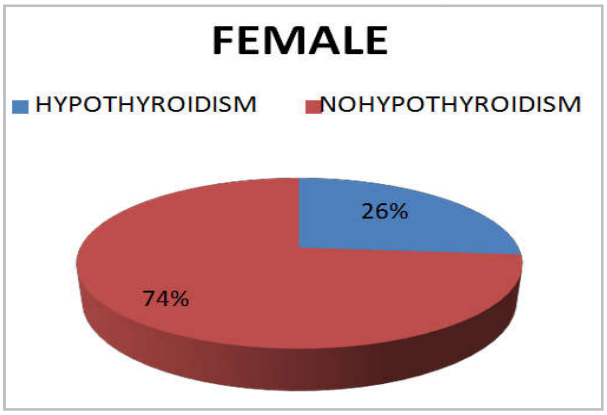
CKD stage	Hypothyroidism TSH >5.5mIu/ml	Nohypothyroidism TSH < 5.5mIu/ml	% Hypothyroidism
CKD I-II	0	5	0
CKD III	1	10	10
CKD IV	2	11	18
CKD V	5	16	31
Total	8	42	19



Distribution according to SEX

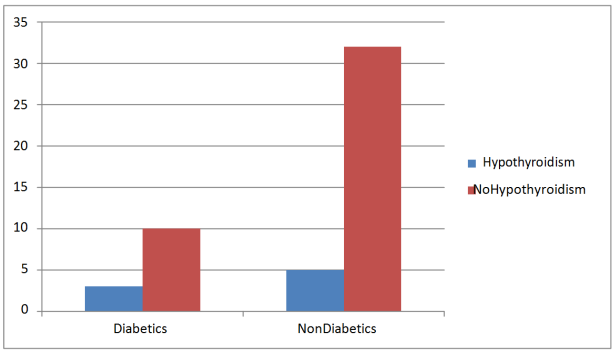
	Hypothyroidism	No hypothyroidism
Male	3	28
Female	5	14
Total	8	42





Distribution according to diabetic status

	Hypothyroidism	No Hypothyroidism	Total
Diabetics	3	10	13
Nondiabetics	5	32	37
Total	8	42	50



Studyc haracteristics

Characteristic	Hypothyroidism	No hypothyroidism	P value
Age,mean ±SD	55.5±13.959	41.61± 14.565	0.0165
Female, N (%)	5(62.5%)	14(33.3%)	0.2317 R.R–2.719
TSH(µ IU/ml)	36.36 ±39.72	3.03 ± 1.30	<0.0001
TOTALT4 (µg/ml)	4.38±0.499	9.74±1.96	< 0.0001
TOTALT3 (ng/ml)	0.51±0.11	1.10±0.249812	< 0.0001
EGFR(MDRD) (ml/mt)	15.34 ±9.70	24.74 ±16.76	0.1326
Diabetis,N	3	10	0.413 R.R-1.575

DISCUSSION

Among there presentative sample of patients with CKD, we found an increased prevalence of hypothyroidism in persons with reduced estimated GFR, independent of age and gender.

According to previous studies, like Michel Chonchol *et al*[5], JoanC. Lo *et al*[6], It has been estimated that the prevalence of subclinical primary hypothyroidism ranges between 4% and 10% in the general population.

Michel Chonchol *et al*[5] studied 3089 adults. 293 (9.5%) had subclinical primary hypothyroidism. The prevalence of subclinical hypothyroidism in patients with GFR>90ml/min/1.73m 2 is 7%. Whereas, in patients with aneGFR<60ml/minper1.73m2 the prevalence of hypothyroidism is 17.9%.(*P*<0.0001for trend).

JoanC.Lo, Glenn M.Chertow, Alan S. Go, and Chi-YuanHsu[6] studied 14,623 adults. The mean age was 48.7 years and 52.6% were women. The prevalence of hypothyroidism in different stages of CKD include-5.4% with GFR≥90, 10.9% with GFR 60-89,20.4% with GFR45-59,23.0% with GFR30-44, and 23.1% with GFR<30ml/mt/1.73m^2(*P* <0.001for trend). There is increased prevalence as the GFR declines.

With progressively lower estimated GFR, there was agraded increased likelihood of hypothyroidism. Accordingly, there wasa significant inverse association between estimated GFR and TSH levels through out the normal and high TSH ranges.

In the present study, all the patients selected are diagnosed to have renal impairment of varying severity. Total number of patients studied-50. Average age of the patients studied-43.84±15.22 years. 33.3% are women. Whereas in the study by Joan c.lo *et al*[5] the the mean age was 48.7years, and 52.6% were women. In AliA.Allawi study[7] in Iraqi patients with CKD the mean age is 60 years, and 42% were women. In studies by Michel Chonchol *et al* and Joan C.Lo *et al*, study population are general population with varying degrees of GFR.
Whereas in the present study and AliA.Allawi study, the population selected were patients suffering from varying degrees of renal failure.

There is increasing prevalence of hypothyroidism as the severity of renal impairment increases in the present study. Percentage of hypothyroidismin CKDSTAGEIII, IV, STAGE V patients is 10%, 18%, 31% respectively in our study. These findings are consistent with previous studies like Michel Chonchol *et al*, JoanC.Lo *et al*, AliA. Allawi study. Although numerous contributing factors have been hypothesized, including altered iodine metabolism, decreased peripheral sensitivity to hormones, and auto immune thyroiditis, the exact underlying mechanisms linking advanced CKD and primary thyroid dysfunction remain unclear. In the present study, Hypothyroidism is more common in female patients with CKD compared with males. This finding is not statistically significant (Pvalue-0.2317, R.R-2.719). These findings consistent with those observed in the study by Michel Chonchol *et al*, Joan C. lo *et al*.

In the present study, hypothyroidism is more common in diabetic patients with CKD compared with nondiabetic patients with CKD. This finding is not statistically significant (Pvaue-0.413, R.R-1.575)

Previous studies have reported a higher prevalence of goiter and thyroid hormone abnormalities in persons with end-stage renal disease.

It also showed that Total T3 and Total T4 levels were lower than normal specially among patients with stage 4 & 5 CKD and a progressive reduction in values of Total T3 and

Total T4 were noticed as the severity of renal failure increased.

Limitations

Our study has several limitations:

1. The overall sample size is small.
2. The definition of kidney function was based on estimated GFR rather than on more precise measurement of kidney function, such as iothalamate clearance.
3. Nonthyroidal (*e.g.*,lowT3 syndrome, which is typically seen in some ill patients, including those with end-stage renal disease) and thyroidal causes of hypothyroidism were not identified.
4. Given that only TSH and total T4 (rather than free T4) levels are tested, complete assessment of thyroid function is not possible. However, TSH concentration is considered the most sensitive indicator of hypothyroidism among individuals in the absence of acute illness.
5. GFR estimated using the MDRD equation, which maybe less precise at higher GFR levels.

Further studies should explore potential causal mechanisms through which CKD maybe associated with increased TSH and reduced thyroid function, including the possible roles of auto immunity, iodine excess, and potential effects of retained solutes, such as organic acids and guanidi nocompounds, on thyroid function.

The roles of clinical or subclinical hypothyroidism on physical function, cognitive function, quality of life, and depressive illness in CKD are unknown. However, health professionals caring forpatients with CKD should be cognizant that CKD and hypothyroidism may exhibit overlapping symptom complexes. Future investigations are needed to determine the value of assessing or screening for clinical and subclinical hypothyroidism among persons with CKD and ESRD.

Summary

Feature	Michel Chonchol *et al*	Joanc.Lo *et al*	AliA.Allawi	Present study
No.of patients	3089	14,623	50	50
Male:female	F>M	F>M	M>F	M>F
Age	54.9±16.2 yr	48.7±18.9 years	60years	43.84±15.22399
TSH(mIU/L) (hypothyroid pts)	8.19±5.72	5.30	-	36.36± 39.72
Hypothyroidpts	293	655	8	8
Hypothyroidism	17.9%in EGFR <60%	23.1%in EGFR <30(ml/mt)	21.79%in EGFR<15ml/mt	31%in EGFR<15ml/mt

CONCLUSIONS

1. Prevalence of hypothyroidism in chronic kidney disease patients is about 19%.
2. Prevalence of hypothyroidism increases as the severity of the renal impairment increases. Its prevalence in CKD Stage IV, V patients is18%, 31% respectively.
3. Hypothyroidism is more common in female patients with CKD compared with males.
4. Hypothyroidism is more common indiabetic patients with CKD compared with non-diabetic patients with CKD.

References

1. FeinsteinEI, KapteinEM, NicoloffJT & MassrySG. Thyroid function in patients with nephrotic syndrome and normal renal function. *American Journal of Nephrology*1982;2:70-76.
2. KapteinEM, Quion-Verde H & Massry SG. Hemodynamic effects of thyroid hormone. Contributions to Nephrology 1984; 41:151-159.
3. KapteinEM. Thyroid function in renal failure. *Contributions to Nephrology* 1986; 50:64-72.
4. KapteinEM, Feinstein EI & Massry SG. Thyroid hormone metabolism in renal diseases. *Contributions to Nephrology* 1982; 33: 122-135.
5. Giacomo Zoppini, Michele Muggeo, and Giovanni Targher. Prevalence of Subclinical Hypothyroidism in Patients with Chronic Kidney Disease *Clin J Am Soc Nephrol* 2008;3:296-1300.
6. JoanC.Lo, GlennM. Chertow, AlanS.Go, and Chi-Yuan Hsu increased prevalence of subclinical and clinical hypothyroidism in persons with chronic kidney disease *kidney international* 2005;67:1047-1052.
7. AliA.Allawi, Prevalence of Hypothyroidism In Chronic Kidney Disease Among Sample Of Iraqi Patients**.** *JFacMed Baghdad* 2013; 55: 2

How to cite this article:

Gangadhar B *et al* (2017) 'Study of Hypothyroidismin Chronic Kidney Disease Patients', *International Journal of Current Advanced Research,* 06(12), pp. 7940-7943. DOI: http://dx.doi.org/10.24327/ijcar.2017.7943.1257

****