ORIGINAL ARTICLE

FREQUENCY OF THYROID DYSFUNCTION IN CHRONIC KIDNEY DISEASE PATIENTS

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ABSTRACT

Objective: To determine the frequency of thyroid dysfunction in chronic kidney disease patients.

Methods: A Cross-sectional Study conducted at Department of Medicine, Bahawal Victoria Hospital, Bahawalpur. Duration of the study was 20th October 2018 to 19th April 2019. Seventy-two patients with chronic kidney disease, 20 to 60 years of age and of both genders were included. Patients with known thyroid disorders or taking medication that can affect thyroid function (dopamine antagonists, antiepileptic, oral contraceptives, lithium, and glucocorticoids) were excluded. Venous blood sample was taken and sent to the laboratory for thyroid function tests.

Results: Age of the patients included in this study was from 20 to 60 year and mean age was 41.97 ± 9.76 years. Most of them 42 (58.33%) were between 41 to 60 years of age. Out of 72 patients, 44 (61.11%) were male and 28 (38.89%) were female with male to female ratio of 1.6:1. Mean duration of disease in our study was 5.71 ± 2.50 years. Mean BMI was 27.75 ± 3.01 kg/m2.Thyroid dysfunction was present in 23 (31.94%) patients of chronic kidney disease.

Conclusion: Thyroid dysfunction is frequently found in chronic kidney disease patients.

Keywords: chronic kidney disease, thyroid dysfunction, hypothyroidism.

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INTRODUCTION

Chronic kidney disease (CKD) is characterized by irreversible and progressive decline in kidney function secondary to a group of pathophysiologic processes. Kidney has excretory metabolic and synthetic functions. When kidney stops working many unwanted toxic substances accumulate in body leading to different signs and symptoms.[1] Thyroid hormone is also metabolized and excreted by kidneys so when kidneys stop working levels of thyroid hormones are also disturbed. [2-3]

Hypothyroidism, both overt and subclinical, is more prevalent in CKD as compared to hyperthyroidism, [4] with subclinical hypothyroidism being the most common [5.] In a study almost half patients of CKD were found to have thyroid dysfunction[6]. Whereas in dialysis population the prevalence of subclinical and overt hypothyroidism was 26.6%[7.] While in another study done in India subclinical hypothyroidism was found in 24.8% of the dialysis population.[8] A study done in peritoneal dialysis (PD) patients reported prevalence of subclinical hypothyroidism and subclinical hyperthyroidism 15.6% and 4.1% respectively[9].

As the chronic kidney disease goes on increasing in our population and thyroid dysfunction is associated with CKD, so the purposed significance of my study was to evaluate the frequency of thyroid dysfunction in chronic kidney disease patients. The

above-mentioned studies have shown variability in frequency of thyroid dysfunction in CKD patients among different ethnic groups, so there is a need of a study in our geographical area which will provide the local magnitude of the problem. As routinely thyroid functions in CKD patients are not assessed in our general practice and failure to recognize the presence of abnormal thyroid hormone level in CKD may be a cause of poor prognosis, so the results of my study will help the clinicians to design a proper management protocol for these patients in order to reduce the morbidity of our population.

METHODS

It was a descriptive, Cross-sectional survey. All patients with chronic kidney disease as per-operational definition, between ages of 20-60 years, of both genders who were admitted in Department of Medicine, Bahawal Victoria Hospital, Bahawalpur were included. Study was conducted over a six-month period from 20th October 2018 to 19th April 2019.Patients were excluded if were taking medication that can affect thyroid functions (dopamine antagonists, antiepileptic, oral contraceptives, lithium, glucocorticoids) as assessed on history and medical record. Pregnant patients and Patients with known thyroid disorders evaluated on history and medical record were excluded as well. All patients participated in this study after an Informed consent. Sampling technique was non-probability, consecutive sampling. Sample size of 72 was calculated by using $n=z^2pq/d^2$ where Z=1.96, p=24.8%[8], q=100-p, d=10%.

Approval was taken from the hospital committee of faculty members. Venous blood sample was taken and sent for thyroid function tests to the laboratory and thyroid dysfunction (as per-operational definition) was noted. All the data including the demographic data (age, gender, BMI, diabetes mellitus and hypertension) obtained from patients was recorded on the predesigned questionnaire. Chronic Kidney Disease was labeled if serum creatinine was above 1.3mg/dl on laboratory examination for last 12 weeks. Any of these Chronic Kidney Disease Stages was included:

- Stage 1: GFR > 90 ml/min.
- Stage 2: GFR between 60-90 ml/min.
- Stage 3: GFR between 30-59 ml/min.
- Stage 4: GFR between 15-29 ml/min.
- Stage 5: GFR < 15 ml/min

Patient was considered hypothyroid if TSH >5.2 mIU/L, FT_3<1.5 pg/ml and FT_4<0.8 pg/ml and was considered hyperthyroid if TSH <0.2 mIU/L and FT_3>4.2 pg/ml, FT_4>1.68 pg/ml. SCH was labelled if serum thyroid stimulating hormone (TSH) was above the normal limit with normal level of free thyroxine (T4).

Formula used for BMI calculation was;

BMI = weight in kilograms / height in meters^2 (as measured by stadiometer)

>27 was taken as obese and ≤27 as non-obese.

Data entry and analysis was done using SPSS version 22.0. Mean and standard deviation for the age of the patients, duration of CKD and BMI were calculated by applying descriptive statistics. We calculated percentages and Frequencies for categorical variables such as gender, stage of CKD (I/II/III/IV/V), diabetes mellitus (yes/no), hypertension (yes/no) and on hemodialysis (yes/no). Effect modifiers like age, gender, duration of CKD, BMI, stage of CKD (I/II/III/IV/V), diabetes mellitus (yes/no), hypertension (yes/no) and on hemodialysis (yes/no) were controlled by chi square test & fisher's exact test and if p-value was ≤ 0.05, it was considered as significant.

RESULTS

Mean age of patients in our study was 41.97 ± 9.76 years ranging from 20 to 60 years. Most of them were between 41 to 60 years of age. Out of 72 patients, 44 (61.11%) were male and 28 (38.89%) were females with male to female ratio 1.6:1. Distribution of patients according to stage of CKD is shown in Figure I.

Mean duration of disease in our study was 5.71 ± 2.50 years. Mean BMI was 27.75 ± 3.01 kg/m^2.out of 72 patients, 35 patients (48.61 %) were diabetic and 44 patients (61.11%) were hypertensive. In our study, frequency of thyroid dysfunction in chronic kidney disease patients was found in 23 (31.94%) patients.

Figure I: Distribution of patients according to stage of CKD (n=72)

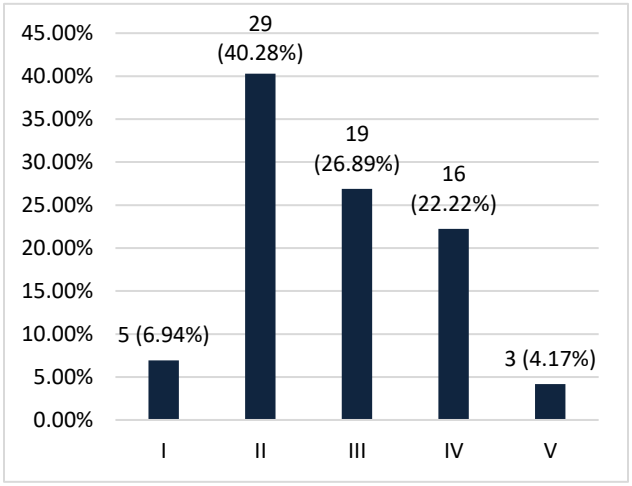

Table 1 has shown the stratification of thyroid dysfunction with respect to stage of CKD and

duration of CKD. Stratification of thyroid dysfunction with respect to BMI, DM & HTN is shown in Table 2.

Table I: Stratification of thyroid dysfunction with respect to stage and duration of CKD.

Stage	Thyroid dysfunction		p-value
	Yes	No	
I	03	02	
II	09	20	
III	08	11	0.195
IV	02	14	
V	01	02	
Duration			
≤5	13	33	0.373
>5	10	16	

Table II: Stratification of thyroid dysfunction with respect to DM, HTN & BMI.

	Thyroid dysfunction		p-value
	Yes	No	
DM			
Yes	09	26	0.270
No	14	23	
Hypertension			
Yes	16	28	0.313
No	07	21	
BMI (kg/m^2)			
≤27	09	25	0.346
>27	14	24	

DISCUSSION

Thyroid hormone has very important role in maintaining the normal metabolism of body. It also affects functions of other hormones. As the kidney function is compromised metabolism of thyroid hormone is also affected leading to thyroid abnormalities. Inversely thyroid hormone abnormalities, if left untreated, also increase the chance of developing kidney dysfunction.so proper diagnosis and treatment of thyroid dysfunctions are very important in the setting of kidney disease[10].

We conducted this study to determine the frequency of thyroid dysfunction in chronic kidney disease patients. Age of the patients included in this study was from 20 to 60 year and mean age was 41.97 ± 9.76 years. Most of them 42 (58.33%) were between 41 to 60 years of age. 44 patients (61.11%) were male and 28 patients (38.89%) were females with male to female ratio 1.6:1. In our study, frequency of thyroid dysfunction in chronic kidney disease patients was found in 23 (31.94%) patients.

A Survey concluded the data of almost fifteen thousand adults which shows the inverse relation of GFR with hypothyroidism i-e with progressive reduction in GFR chance of hypothyroidism increases[11]. Chonchol M et al concluded the same in his study[12].

In CKD altered metabolism of thyroid hormones affects the activity and blood levels of hormones[13]. Overt biochemical hypothyroidism, subclinical hypothyroidism (SCH), and low triiodothyronine (T3) syndrome have been reported in CKD population with subclinical hypothyroidism being the most common[14-16]. Hypothyroidism increases the risk of cardiovascular diseases as well making it even more important to diagnose and manage in order to reduce the overall mortality in CKD population[17]. As far as hyperthyroidism is concerned many studies done in CKD patients found no difference in its prevalence from general population[18].

Many studies have shown that goiter and thyroid abnormalities are common in end stage renal disease[19-23]. Some studies suggested thyroid abnormalities as an independent predictor of mortality in ESRD patients[20-22] probably because of chronic inflammation[23].There are several proposed hypothesis to explain the mechanism connecting the kidney failure with thyroid malfunction but none of them proved to be the rite one.in one study hyponatremia has been observed due to abnormal retention of water in distal nephron in patients of myxedema.[24]. Moreover, cardiac dysfunction secondary to hypothyroidism may also cause changes in intrarenal hemodynamics leading to kidney dysfunction.

In patients with early CKD the prevalence of thyroid abnormalities is very less studied.in a nationally representative cohort of U.S. adults it was observed hypothyroidism ,both subclinical and clinical, has a direct correlation with decline in GFR with prevalence of more than 20 % in late CKD. [21]

CONCLUSION

This study concluded that frequency of thyroid dysfunction in chronic kidney disease patients is quite high. So, we recommend that thyroid functions in CKD patients should be assessed routinely for its early recognition and management in in order to reduce the morbidity of these particular patients.

CONFLICT OF INTEREST

None

ETHICAL APPROVAL

The study was approved from Institutional Ethical Review Board of Quaid-e-Azam Medical College, Bahawalpur, Pakistan, vide Reference No. 449/DME/ QAMC Bahawalpur dated November 30, 2020.

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AUTHOURS CONTRIBUTIONS

AM: Data Collection, Literature Review
RA: Manuscript Writing, Statistical Analysis
MS: Manuscript Writing
RH, SN: Data Collection
ZF: Data Collection, Topic Selection