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SUBCLINICAL HYPOTHYRIDISM IN PATIENTS WITH CHRONIC KIDNEY DISEASE VISITING AT TERTIARY CARE HOSPITAL, KARACHI

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Abstract:

Objective: *To determine frequency of sub-clinical hypothyroidism in chronic disease patients.*

Patients and Methods: *A cross sectional study conducted through non-probability purposive sampling from March to September 2010 in the Department of nephrology at Jinnah Postgraduate Medical College (JPMC), Karachi. Total 158 patients aged ≥18years with stage 3 to 5 chronic kidney who not on maintenance hemodialysis were included and patients with history of thyroid surgery, known thyroid disease and on treatment or neck radiation were excluded. Chronic kidney disease defined as lower glomerular filtration rate (stage III 30-59ml/min/1.73m2), stage IV (15-29 ml/min/1.73m2) and stage V (<15 ml/min/1.73m2). Sub-clinical hypothyroidism was defined as elevated thyroid stimulating hormone (TSH) level >4.05mIU/dl and normal thyroxine (T4) level (0.89-1.79ng/dl).*

Results: *Mean age was 50.63 (range 19-85years), 76 (48%) were males and 82 (52%) were females. Sub-clinical hypothyroidism was found in 31 (20%) patients among patients with chronic kidney disease. Out of these, 16 patients (52%) were females and 15 (48%) were males (p=0.565). Most patients (52%) were aged between 45--59 years followed by 25% in ≥60yr and 23 % in aged 18-44years (p=0.371). Among severity of CKD patients; sub-clinical hypothyroidism was found in 38% in stage III CKD, 36% in stage IV CKD and 26% in stage V CKD (p=0.962). Among duration of CKD; sub-clinical hypothyroidism was found in 58% with less than 1year of CKD, followed by 39% between 1-2years and 03% of more than 2 years of CKD (p=0.107).*

Conclusion: *Sub-clinical hypothyroidism is a common problem among patients with CKD and found in 20% of patients. SCH found in younger age group 45--59years and in patients with stage III and IV CKD.*

Key Words: *Sub-clinical hypothyroidism, Chronic Kidney Disease, Glomerular filtration rate*

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INTRODUCTION:

Sub-clinical hypothyroidism (SCH) is prevalent around 3-8% in population regardless of thyroid disorders. [1, 2] It has been observed that SCH is related to dyslipidemia and cardiovascular adverse events [3,4]. Chronic kidney disease (CKD) is common condition and is associated with increase the risk of cardiovascular disease with prevalence of 13.1% in western population [5], while 17.2% in India [6] and 12.5% in Pakistan. [7] The alteration in thyroid hormones accelerates as CKD progresses [8, 9]. Hypothyroidism causes decrease in renal blood flow, glomerular filtration rate; reduce sodium reabsorption and concentrating urine responsible for progression to CKD. [10] The former literature reported SCH to being increase from 7% to 18% with statistical significance [11]. There is limited local data of sub-clinical hypothyroidism in chronic kidney disease, so we conducted study to determine the frequency of sub-clinical hypothyroidism in patients with chronic kidney disease.

PATIENTS & METHODS:

A cross sectional study conducted through non-probability purposive sampling from March to September 2010 in the Department of nephrology at Jinnah Postgraduate Medical College (JPMC), Karachi. Total of 158 patients were included on the basis of prevalence of sub-clinical hypothyroidism in CKD patients. All patients aged ≥18years with stage 3 to 5 chronic kidney who not on maintenance hemodialysis were included while patients with history of thyroid surgery, known thyroid disease and on treatment or neck radiation were excluded. Chronic kidney disease was defined as glomerular filtration rate of <60ml/min/m2 for ≥3 months, irrespective of cause. GFR calculated by Cockcroft's Gaul's formula (140-age x weight in kg/72 x serum creatinine, multiply by 0.85 if female). The staging of chronic disease done on the basis of eGFR level while the sub-clinical hypothyroidism as TSH >4.05mIU/dl and normal T4 level (0.89-1.79ng/dl). After taking informed written consent, patient's data (age, gender, duration of CKD) was taken and patient weight was checked. After that blood sample was sent to laboratory for serum creatinine, TSH and T4 level. GFR was calculated by Cockcroft's Gaul's formula as mentioned above and staging of CKD were done. Sub-clinical hypothyroidism was labelled on the basis of TSH and T4 level. The data was analyzed in SPSS 16 and frequencies and percentages and mean ±SD was calculated, the chi square test was used to determine proportion of sub-clinical hypothyroidism in patients with CKD. Stratification was done with regard to age, gender, duration and stage of CKD while the p-value of ≤0.05 was labeled as significant.

RESULTS:

A total of 158 patients with chronic kidney disease stage 3 to 5 were included in our study. Mean age was 51.62 (range 18-85years). Mean of other variables mentioned in table # 1. Out of 158 patients 76 (48%) were males and 82 (52%) were females. Sub-clinical hypothyroidism was found in 31 (20%) patients among patients with chronic kidney disease. Out of these, 16 patients (52%) were females and 15 (48%) were males (p=0.565). Most patients (52%) were aged between 45--59 years followed by 25% in ≥60yr and 23 % in aged 18--44years (p=0.371). Among severity of CKD patients; sub-clinical hypothyroidism was found in 38% in stage III CKD, 36% in stage IV CKD and 26% in stage V CKD (p=0.962). Among duration of CKD; sub-clinical hypothyroidism was found in 58% with less than 1year of CKD, followed by 39% between 1-2years and 03% of more than 2 years of CKD (p=0.107). The results are presented in table 1-2 and figure 1.

TABLE # 1 MEAN ±SD OF QUANTITATIVE VARIABLES

Variables	Minimum	Maximum	Mean	SD
Age (years)	18	85	51.62	14.118
Weight (kg)	26	105	62.33	13.680
CKD duration (months)	2	120	15.68	15.613
T4 level (ng/dl)	0	6	1.29	0.677
TSH level (mIU/dl)	0	50	3.69	6.308

TABLE # 2 FREQUENCY OF VARIABLES AND ASSOCIATION WITH SCH

Variables	Total Number	Sub-clinical Hypothyroidism	P value
Age			
18-44years	46 (29%)	07 (23%)	
45-59years	64 (41%)	16 (52%)	0.371
≥60years	48 (30%)	08 (25%)	
Gender			
Male	76 (48%)	15 (48%)	0.565
Female	82 (52%)	16 (52%)	
CKD stage			
III	39 (24%)	08 (26%)	
IV	58 (37%)	11 (36%)	0.005
V	61 (39%)	12 (38%)	
Duration of CKD			
<1year	107 (68%)	18 (58%)	
1-2years	39 (25%)	12 (39%)	0.107
>2years	12 (07%)	01 (03%)	
Sub-clinical hypothyroidism	31 (20%)		

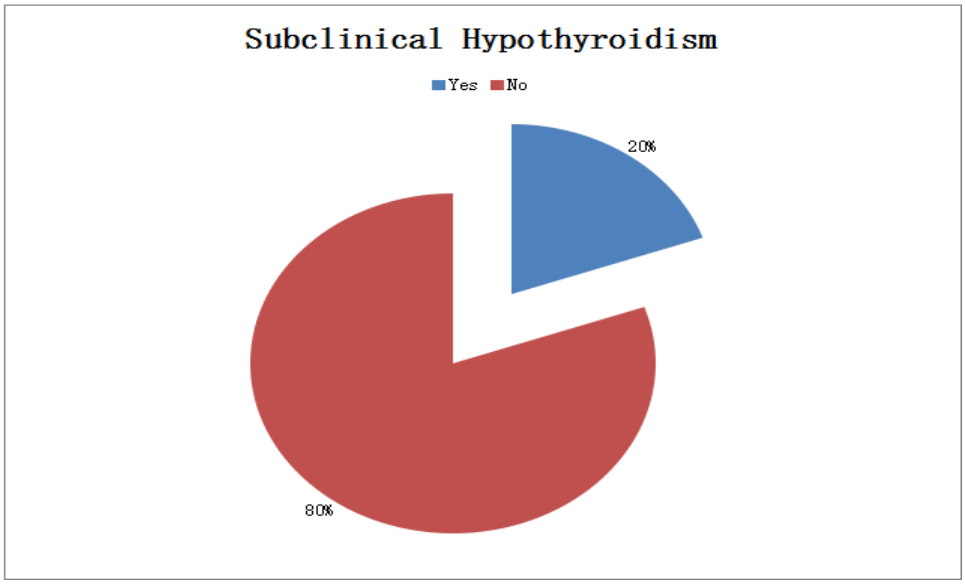

FIGURE 01: THE FREQUENCY OF SUBCLINICAL HYPOTHYROIDISM IN CKD

DISCUSSION:

We conducted study to determine the frequency of SCH among patients with chronic kidney disease at tertiary care hospital. In our study, SCH was found in 20% of CKD patients and this is comparable with study done by Chonchol et al in which SCH was found in 18% with GFR <60 ml/min [11. In our study most patients were females with SCH and most were younger age group**.** The risk of sub-clinical hypothyroidism increase with progression of CKD and found 20.4% with stage III, 23% in stage IV and 23% in stage V CKD (P < 0.001), this comparable with our study in which 26% in stage III, 36% in stage IV and 38% in stage V CKD (p=<0.005) [12]. Former literature has mentioned higher prevalence for thyroid hormones abnormalities or goiter in individuals with chronic kidney diseases [13-17]. Few studies observed that abnormal level of thyroid hormone in subjects required hemodialysis are predictors for cardiovascular mortality [15-17], due to an association with underlying existence of chronic inflammatory process. Various contributing factors has been observed including altered metabolism of iodine, autoimmune thyroiditis and reduce peripheral sensitivity for thyroid hormones, but exact underlying process for such association remain unclear. The overt primary hypothyroidism (myxedema), common metabolic alteration reported is hyponatremia resulting from disturbance in kidney diluting function leads to water re-absorption [18]. Furthermore clinically

overt hypothyroidism also responsible for renal alterations in hemodynamic due to reduce cardiac output leads to progressive reduction in GFR. The future advance studies needs to be conducted in multidisciplinary manner to establish the link between chronic kidney disease and SCH and also to explore the associated cardiovascular and cerebrovascular adverse events. Thus, it has need to be sort further that the individuals with CKS should be explore for SCH at primary, secondary and tertiary care health units requires further multicentre research.

CONCLUSION:

Sub-clinical hypothyroidism is a common issue in subjects with CKD found in 20% patients. SCH found in younger age group 45--59years and patients with stage III and IV disease. Early detection of SCH in CKD may decrease the risk of cardiovascular events and progression of kidney disease. Our limitations include; small sample size, infrequent follow up and we did not focus on impact of SCH on progression of CKD, so need to conduct study at larger scale to detect the relationship of SCH with severity and progression of CKD.

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