

Spectrum of Thyroid Disorders in Type 2 Diabetes Mellitus

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ABSTRACT

Introduction: Diabetes mellitus is a rising global health problem in both developed and developing world including Nepal. Various studies have found that diabetes and thyroid disorders mutually influence each other and both disorders tend to coexist. The coexistence of thyroid dysfunction in diabetic patients is an important barrier in achieving treatment goals. So, we conducted a study to find out the occurrence of various thyroid disorders in patients of type 2 diabetes mellitus.

Material and methods: A descriptive cross-sectional study conducted in the department of Internal Medicine and Endocrinology unit from January 2017 to January 2018. Ethical clearance was obtained from the Institutional Review Board (IRB). Patients with Type 2 DM were evaluated for thyroid dysfunction by testing thyroid profile in standard laboratory. The various thyroid dysfunctions with gender, age, control of diabetes (HbA1C), duration of diabetes was studied. The results were analysed by using statistical package for social sciences (SPSS) version 21.

Results: Total 50 patients of diabetes were enrolled in the study out of which 18 were male and 32 were females. Thyroid dysfunctions were found in 15 out of 50 patients (30%). Among 15 cases of thyroid dysfunctions 10 (66.6%) were female and 5(33.3%) were male. Out of 15 cases with thyroid dysfunctions, subclinical hypothyroidism was the most prevalent 11(22%) followed by primary hyperthyroidism in 4%, primary hypothyroidism in 2%, and subclinical hyperthyroidism in 2%.

Conclusions: One third of the diabetic patients had thyroid dysfunctions. Among which subclinical hypothyroidism most frequently occurred.

Keywords: Type 2 Diabetes Mellitus; Thyroid Disorders.

INTRODUCTION

Thyroid dysfunction is a common endocrine disorder affecting about 300 million people worldwide of which hypothyroidism is much more common.¹⁻⁶ Diabetes and thyroid disorders have been shown to mutually influence each other and associations between both conditions have long been reported.⁷⁻¹³

WHO South-East Asia Region prevalence of diabetes has projected from 436 000 in 2000 to 1 328 000 in 2030.¹⁵ In Nepal the morbidity is highly prevalent; especially of diabetes and thyroid problems.¹⁶⁻¹⁸ A recent hospital-based study done in two different regions of Nepal has shown the prevalence of thyroid dysfunction to be 17.42% and 25% respectively.^{14,19-20}

Due to the mounting urban lifestyle leading to obesity and metabolic syndrome in contrast with endemic Iodine deficiency there is a need for high scale study to find out

the spectrum of thyroid disorders in type 2 diabetes mellitus in Nepal. To fulfil this gap, our study aims to explore the spectrum of thyroid disorders in Type 2 Diabetic patients.

MATERIAL AND METHODS

It was a hospital based cross-sectional study conducted at Diabetes Endocrine OPD and Medicine OPD and Indoor Patients of these Units of National Academy of Medical Sciences (NAMS), Bir hospital, Mahabouddha, Kathmandu. It was conducted for 12 months from January 2017 to January 2018.

Ethical approval was obtained from the Institutional Review Board (IRB) of NAMS (Ref. no. 602) before starting the study. A written informed consent was obtained from all the participants.

Inclusion criteria

- Patients with duration of type 2 DM longer than 6 months
- Patients diagnosed as type 2 DM of age 15-75 years

Exclusion criteria

- Patients with known thyroid disorder
- Pregnant women
- Patients with recent interventions: thyroid surgery, pulse corticosteroids and/or radioiodine, use of amiodarone and other medical comorbidities and use of medications interfering with thyroid function.

Sampling and sample size

The convenience sampling was done and sample size was calculated using the following formula,

$$n = \frac{z^2 p (1-p)}{d^2}$$

Where, n=required sample size, z=statistical value for a level of confidence (for 95% level of confidence, z=1.96); p=estimated proportion in the population and d=precision or maximum tolerable error.

The prevalence of Thyroid disorders in Type 2 Diabetes Mellitus is 11.8 and can be high as years after the onset of diabetes. Hence considering z=1.96, p=0.118 (proportion of Thyroid disorders in T2DM), and d=0.1(precision of 10%),

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total sample size was calculated 40. However, 50 cases were included in the study for convenience.

Statistical package for social sciences (SPSS) version 21 was used for data collection and analysis. Results were presented in tables, graphs and diagrams. For the purpose of this study a 95% confidence interval was accepted and p value of <0.05 was taken as significant.

RESULTS

Age and sex distribution

The age and sex distribution of the patients with Type 2 DM are shown in (figure- 1). The mean age of participants was 54.18 years (SD: 11.894 years) with a range 37 to 84 years where the middle age of (46-60) were 38%, followed by 32% in age group (31-45) and 30% were above 60 years. Most of the diabetic patients are of middle age group between 30 -60 years with female predominance.

(Table-1) shows that among the clinical features of thyroid dysfunctions, most common was palpitation followed by cold

intolerance, constipation then weight gain, lethargy. Though most of the patients who did not have thyroid dysfunctions were asymptomatic.

Table 6 shows the various parameters of the patients enrolled in the study. All of the patients were in 3rd decade of life and above. The minimum age was 37 who had thyroid dysfunction and maximum was 62, mean age was 50 and Std, deviation was 8.537. The finding suggests that most of the people had raised TSH and subclinical hypothyroidism. Most of the patients with thyroid dysfunction had deranged post prandial blood sugar and deranged TG. Also, most of the patients had higher BMI in the overweight group.

DISCUSSION

Among the endocrine metabolic diseases diabetes occupies the major share. Diabetes is responsible for significant mortality and morbidity due to its related complications. This study was conducted at NAMS, Bir Hospital, Kathmandu. Thyroid functions were done in type 2 Diabetic

SN	Complains	Frequency	Thyroid Dysfunction Present	Thyroid Dysfunction Absent	P Value
1	Cold intolerance	4	3	1	0.363
2	Weight gain	3	2	1	0.06
3	Lethargy	5	2	3	0.607
4	Constipation	6	3	3	0.254
5	Heat Intolerance	1	1	0	0.123
6	Weight loss	4	1	1	0.607
7	Palpitation	3	3	0	0.006
8	No symptoms	30	4	26	0.21

Table-1: Frequency of presenting complains of thyroid dysfunctions

Thyroid Status	Number (N= 50)	Male	Female
Euthyroid	35 (70%)		
Subclinical Hypothyroidism	11 (22%)	4	7
Primary Hypothyroidism	1 (2%)	0	1
Subclinical Hyperthyroidism	1 (2%)	0	1
Primary hyperthyroidism	2 (4%)	1	1

Table-2: Distribution of type 2 DM with different thyroid status

Parameters	Thyroid disorders Present (15)	Thyroid disorders Absent (35)	P value
Thyroid dysfunction with gender			
Female(n=32)	10 (31.25%)	22	0.797
Male (n=18)	5 (27.7%)	13	
Thyroid dysfunction with age			
Age <50 (n=19)	8 (42.1%)	11	0.354
Age 50-60(n=16)	5 (31.25%)	11	
Age>60 (n=15)	2(13.3%)	13	

Table-3: Distribution of thyroid dysfunction with gender and age

Thyroid disorders	Age<50yrs	Age 50-60 yrs	Age >60 yrs
Subclinical Hypothyroidism	6	3	2
Primary Hypothyroidism	1	0	0
Subclinical Hyperthyroidism	0	1	0
Primary Hyperthyroidism	1	1	0
Total	8	5	2

Table-4: Thyroid disorders and age group comparison.

Parameters	Thyroid disorders Present (15)	Thyroid disorders Absent (35)	P value
Controlled HBA1C <7(n=14)	6 (42.8%)	8	0.216
Poorly controlled HBA1C > 7(n=36)	9 (25%)	27	
Duration of Diabetes <= 1yr (n=0)	0	0	0.934
Duration of Diabetes 1-5 yrs (n=30)	8 (26.6%)	22	
Duration of Diabetes >5 yrs (n=20)	7 (35%)	13	
HTN Present(n=21)	8 (38%)	13	0.288
HTN Absent(n=29)	7 (24.13%)	22	
With Family History (n=10)	3	7	0.440
With Family History (n=10)	12	28	

Table-5: Distribution of thyroid dysfunction with HBA1C, duration, HTN and family history

Parameters	Minimum	Maximum	Mean	Std. Deviation
Age (yrs)	37	62	50.20	8.537
fT3 (pg/ml)	1.60	6.54	3.7407	1.44503
fT4 (ng/dl)	0.25	3.59	1.3873	0.88850
TSH (mIu/L)	0.02	94.92	10.2540	23.68069
FBS (mg/dl)	60	237	145.40	61.125
PPBS(mg/dl)	68	388	206.47	95.914
HBA1C	4.8	11.8	7.463	1.5801
Height(cm)	142.0	166.0	152.733	7.5637
Weight(kg)	49.0	67.0	57.267	5.9817
BMI(kg/m ²)	19.87	30.58	24.4980	3.01980
Cholesterol	108	312	199.87	56.127
HDL	36	64	47.80	9.283
LDL	36	160	98.53	31.353
TG	64	321	178.00	66.953

Table-6: Baseline parameters of diabetic patients with thyroid dysfunctions

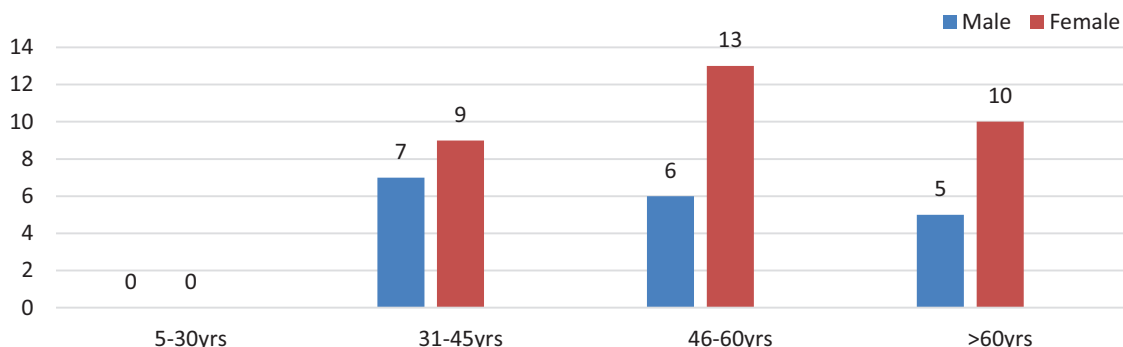


Figure-1: Age and sex distribution of patents.

patients attending the out-patient department and in-patient department.

In this study 32 females and 18 male patients were enrolled with the female to male ratio of 1.7: 1 where thyroid dysfunction was found in 15(30%) out of 50 patients. Among 15 patients of thyroid dysfunctions 10(66.6%) were females while 5(33.3%) were males. Out of the 15 patients with thyroid dysfunction 11 had subclinical hypothyroidism followed by primary hyperthyroidism (2), primary hypothyroidism (1) and subclinical hyperthyroidism (1). Subclinical hypothyroidism had female predominance. Our study is comparable to the study done by Pasupathi et al²⁵ where 45% patients had thyroid dysfunctions. The study of Vikram B Vikhe et al²⁴ (30%) done in Shri Sathya Sai Medical College and Research Institute, India, Priti Singh et

al²¹ (29%) among mid and far western Nepalese population in Nepalgunj medical college also show similar results of thyroid dysfunction in Type 2 diabetic patients.

The higher occurrence of thyroid dysfunction in our study may be attributed to the study being a hospital based enrolling diabetic subjects, poor glycemic control in most of the subjects, smaller sample of the study, selection bias during sampling and moreover no provision of repetition of the test samples.

A prevalence of 12.3% was reported among Greek diabetic patients¹⁵ and 16% of Saudi²⁶ patients with type 2 diabetes were found to have thyroid dysfunction. In Jordan²⁷, A study reported that thyroid dysfunction was present in 12.5% of Type 2 diabetic patients. Perros et al.¹⁴ demonstrated an overall prevalence of 13.4% of thyroid diseases in diabetics

with the highest prevalence in type 1 female diabetics (31.4%) and lowest prevalence in type 2 male diabetics (6.9%).

Our results were higher when compared to the prevalence of 14.7% in a previous study by Palma et al.²² who included a larger sample size of 386 diabetics among which 21% were type 1 DM patients. This was much higher than that of Maskey et al.¹⁸ done at BPKIHS, in which of 271 subjects, the prevalence of hypothyroidism (clinical and subclinical) in diabetics was, 4.05% (11/271) with females' preponderance, of which 7 (30.4%) were clinically hypothyroid and 4 (17.4%) were subclinical hypothyroid. One (4.3%) patient had subclinical hyperthyroidism.

While in another study from BPKIHS, Saroj Khatiwada et al.²³ prevalence rate of thyroid dysfunction was 36.03%, with subclinical hypothyroidism (26.5%) as the most common thyroid dysfunction. Thyroid dysfunction was much common in females (42.85%) compared to males (30.04%) and in type 1 diabetes (50%) compared to type 2 diabetes mellitus (35.41%)

CONCLUSIONS

One third of the diabetic patients had thyroid dysfunctions among which subclinical hypothyroidism most frequently occurred. The thyroid dysfunctions were high in females, elderly, poorly controlled diabetes (HbA1C values ≥ 7), duration of diabetes greater than 5 years, patients with obesity and deranged lipids. Though the association of thyroid dysfunctions with diabetes was not found to be statistically significant. We recommend that thyroid profile should be a routine screening test in all patients with Type 2 Diabetes Mellitus, especially in females, poorly controlled, duration of diabetes >5years and those with obesity.

However, we reinforce that prospective studies with a greater number of study subjects is necessary to clarify and establish these recommendations.

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