Original Article

Thyroid Disorders in Patients with Type 2 Diabetes Mellitus

Rajesh Kumar Mandal[1]

[1]Department of Internal Medicine, Bheri Hospital, Nepalgunj

Keywords: *Diabetes mellitus, type 2; hypothyroidism; prevalence; thyroid diseases.*

Abstract

Background: Diabetes mellitus is a public health problem world wide. Diabetes and thyroid disorders influence each other and tend to coexist. The recognition of this relationship is essential for achieving treatment goals. So, we conducted this study to find out the prevalence of thyroid disorders in patients with type two diabetes mellitus presenting to the department of internal medicine and endocrinology unit.

Methods: It was a descriptive cross-sectional study conducted in the Department of Internal Medicine and Endocrinology unit of Bir Hospital from June 2018 to May 2018. Ethical clearance was obtained from the institutional review committee. Patients with Type two diabetes mellitus were evaluated for thyroid dysfunctions. The various thyroid dysfunctions with gender, age, control of diabetes and duration of diabetes were studied. The results were analyzed by using the Statistical Package for the Social Sciences version 21. Point estimate at 95% Confidence Interval was calculated along with frequency and proportion for binary data.

Results: The prevalence of thyroid dysfunction among 50 patients enrolled was 15(30%) (n-n at 95% confidence interval). Thyroid dysfunctions were greater in females 10(66.66%) while 5(33.33%) in male. Out of 15 cases with thyroid dysfunctions, sub-clinical hypothyroidism was the most prevalent 11(22%) followed by primary hyperthyroidism in 2(4%), primary hypothyroidism in 1(2%), and sub-clinical hyperthyroidism in 1(2%).

Conclusions: The prevalence of thyroid dysfunctions was comparable from study from Eastern Nepal while higher than from study from Jordan and Greece. Sub-clinical hypothyroidism was the most frequently occurring thyroid dysfunction.

Introduction

The two most common endocrine disorders diagnosed and found in clinical practice in different ages and different populations all the time are diabetes mellitus (DM) and thyroid dysfunction (TD). Both of them affect each other.[1] The prevalence of diabetes is expected to raise from 171million in 2000 to reach 366million in 2030.[2]

There is great variability in the prevalence of Thyroid dysfunctions in general population, ranging from 6.6% to 13.4%. In diabetic patients, the prevalence is still greater and varies from 10 to 24%.[3] In Nepal the morbidity of diabetes and thyroid disorders is highly prevalent.[4-6] Due to urbanization, obesity and metabolic syndrome along with endemic Iodine deficiency there is a need of high scale study to find out thyroid disorders in type 2 diabetes mellitus in Nepal.

This study aims to find out the prevalence of thyroid disorders in patients with type two diabetics at the department of internal medicine and endocrinology of a tertiary care hospital.

Methods

A descriptive cross-sectional study was conducted at Department of Internal Medicine and Endocrine unit of National Academy of Medical Sciences (NAMS), Bir hospital, Kathmandu from March 2018 to August 2018. The Ethical clearance was obtained from the Institutional Review Board (IRB) of NAMS before starting the study (Ref. no. 602). Patients with duration of type two diabetes longer than six months and between age group 15-75 years were included in the study. Patients with known thyroid disorder, pregnant ladies, and those with recent interventions that include thyroid surgery, pulse

***Corresponding Author:**

Dr Rajesh Kumar Mandal

Department of Internal Medicine,

Bheri Hospital, Nepalgunj, Nepal.

Email: rkmandal338@gmail.com,

Phone: +977-9848042427.

corticosteroids, and/or radio-iodine, use of amiodarone and other medical comorbidity and use of medications interfering thyroid function were excluded from the study. Convenience sampling was done and sample size was calculated using the following formula, $n=z^2p\ (1-p)/d^2$,Where, n = required sample size, Z = 1.96 at 95% Confidence Interval (CI) , p = prevalence of thyroid disorder in type two diabetics, 14.7%.[3] e = margin of error, 10% . The total sample size was calculated as $n=z^2p\ (1-p)/d^2$, $n= (1.96)^2 \times 0.147(1-0.147)/ (0.1)^2$, n= 48.17. However, 50 cases were included in the study. Statistical package for social sciences (SPSS) version 21 was used for data collection and analysis. Results were presented in tables.

Results

A total of 50 patients were enrolled in the study. Among them, 18 (36%) were male and 32(64%) were female. The prevalence of thyroid dysfunction among 50 patients enrolled was 15(30%). Out of 15 cases with thyroid dysfunctions, sub-clinical hypothyroidism was the most prevalent 11(22%) followed by primary hyperthyroidism in 2(4%), primary hypothyroidism in 1(2%), and sub-clinical hyperthyroidism in 1(2%). (Table 1).

Table 1. Thyroid status in type 2 Diabetes mellitus patients with sex distribution.

Thyroid Status	N= 50 (%)	Male n (%)	Female n (%)
Euthyroid	35 (70%)		
Subclinical Hypothyroidism	11 (22%)	4(8%)	7(14%)
Primary Hypothyroidism	1 (2%)	0	1(2%)
Subclinical Hyperthyroidism	1 (2%)	0	1(2%)
Primary hyperthyroidism	2 (4%)	1(2%)	1(2%)

The mean age of participants was 54.18 years (SD: 11.894 years) with a range 37 to 84 years. Thyroid diseases with age distribution wise. (Table 2).

Table 2. Thyroid disease in type 2 Diabetes mellitus with age group distribution.

Thyroid disorders	Age < 50yrs (%)	Age 50-60 yrs (%)	Age > 60 yrs (%)
Subclinical Hypothyroidism	6 (12%)	3 (6%)	2 (4%)
Primary Hypothyroidism	1 (2%)	0	0
Subclinical Hyperthyroidism	0	1 (2%)	0
Primary Hyperthyroidism	1 (2%)	1 (2%)	0
Total	**8 (16%)**	**5 (10%)**	**2 (4%)**

Thyroid disease in type 2 diabetes mellitus patients were effected by glycemic control, duration of diabetes, hypertension and history of diabetes in family. (Table 3).

Table 3. Thyroid disease status with HBA1C, duration of diabetes, Hypertension and family history.

Characteristics	Thyroid disease Present n=15 (%)	Thyroid disease Absent n=35 (%)
Controlled HBA1C <7(n=14)	6 (42.8%)	8 (57.14%)
Poorly controlled HBA1C> 7(n=36)	9 (25%)	27 (75%)
Duration of Diabetes<= 1yr (n=0)	0	0
Duration of Diabetes 1-5 yrs (n=30)	8 (26.6%)	22 (73.33%)
Duration of Diabetes >5 yrs (n=20)	7 (35%)	13 (0.65%)
With Family History of DM (n=10)	3 (30%)	7 (70%)
With out Family Historyof DM (n=40)	12 (30%)	28 (70%)
HTN Present(n=21)	8 (38%)	13 (61.90%)
HTN Absent(n=29)	7 (24.13%)	22 (75.86%)

The base line characteristics of type 2 diabetes mellitus patients with thyroid disease (Table 4).

Table 4. Baseline characteristics of type 2 diabetic patients with thyroid disease.

Characteristics	Minimum	Maximum	Mean	Std. Deviation
Age (yrs)	37	62	50.20	8.537
fT3 (pg/mi)	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/m2)	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

Discussion

Diabetes occupies the major share of the endocrine metabolic diseases. Diabetes and its related complications are responsible for significant mortality and morbidity. Thyroid and diabetes co exists and influences each other. Therefore both should be managed side by side to achieve the treatment goals. In this study 32 females and 18 male patients were enrolled with a 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(22%) had sub-clinical hypothyroidism followed by primary hyperthyroidism in 2(4%), primary hypothyroidism in 1(2%) and sub-clinical hyperthyroidism in 1(2%) patients. Sub-clinical hypothyroidism had female predominance 7(14%).

This study is comparable with the findings of the study from Tamil Nadu, India where 45% patients had thyroid dysfunctions.[7] Another study from Shri Sathya Sai Medical College and Research Institute, India also had thyroid dysfunctions of 30%.[8] The higher occurrence of thyroid dysfunction in this study may be attributed to the study being a hospital based enrolling diabetic subjects, poor glycemic control in most of the subjects, longer duration of diabetes, lack of follow up in treatment, smaller sample size, selection bias during sampling and moreover no provision of repetition of the test samples.

A prevalence of 12.3% of thyroid dysfunctions was reported among Greek diabetic patients[9] and 16% in Saudi patients[10] with type 2 diabetes mellitus. A study reported from Jordan stated that thyroid dysfunction was present in 12.5% of Type 2 diabetic patients.[11] A literature from Diabetes medicine 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%).[12] This study results were higher when compared to the prevalence of 14.7% in a previous study from outpatient clinic of the Diabetes unit, Hospital Universitário Pedro Ernesto, which included a larger sample size of 386 diabetics among which 21% were type 1 DM patients.[3] This was much higher than that of study done from Eastern Nepal 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.[13] While in another study from Eastern Nepal, revealed that the 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%).[14]

The higher prevalence of thyroid disorders in type two diabetes mellitus patients in this study may be due to the fact that the study was hospital based , moreover the sample size was smaller, non randomized and the result should be supported by larger data.

Conclusion

The prevalence of thyroid disorders was higher than the international data from Jordan, Saudi and Greece while comparable with studies from Eastern Nepal. The regular screening of thyroid function tests are recommended in type two diabetes mellitus which should be supported by larger data.

Conflict of Interest: None.

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