MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.36478/makrjms.2024.10.181.187

OPEN ACCESS

Key Words
Prevalence, thyroid dysfunction, middle aged, type2 diabetes mellitus, women of child bearing age

Corresponding Author
Srinivasa Prabhu,
Department of General Medicine, KC General Hospital Bengaluru India

Author Designation
[1,2,3]Senior Resident
[4]Professor

Received: 08 July 2024
Accepted: 11 August 2024
Published: 12 September 2024

Citation: Thandra Ramoji Babu, B. Gunashree, P.S. Khadeeja Shebin and Srinivasa Prabhu, 2024. Prevalance of Thyroid Dysfunction in Middle Aged Type 2 Diabetes Mellitus Women of Child Bearing Age. Res. J. Med. Sci., 18: 181-187, doi: 10.36478/makrjms.2024.10.181.187

Prevalance of Thyroid Dysfunction in Middle Aged Type 2 Diabetes Mellitus Women of Child Bearing Age

[1]Thandra Ramoji Babu, [2]B. Gunashree, [3]P.S. Khadeeja Shebin and [4]Srinivasa Prabhu

[1-4]Department of General Medicine, KC General Hospital Bengaluru India

ABSTRACT

Diabetes mellitus (DM) is an epidemic and global burden of disease worldwide, with developing countries having the highest risk. The number of people with diabetes is increasing due to population growth, aging, urbanization and increasing prevalence of obesity and physical inactivity. To find the spectrum of thyroid dysfunctions in middle aged women with type 2 diabetes mellitus. The present study was carried out in the Department of General Medicine, K.C GENERAL HOSPITAL during a period of 18 months from january 2019 to August 2020. Prevalence of thyroid dysfunction was seen in 34.48% of middle aged Indian female patients with type 2 diabetes mellitus, of which 21.84% had hypothyroidism., 9.20% had sub-clinical hypothyroidism and 3.45% had hyperthyroid. Indian female diabetics 32 patients had poor glycemic Control (HbA1c%>8) even with treatment., among them 10 patients had hypothyroidism and 6 patients had sub-clinical hypothyroidism,3 patients had hyperthyroidism A serum TSH within euthyroid range almost always eliminates the diagnosis of hypothyroidism or hyperthyroidism. TSH is preferred screening test for thyroid dysfunction in diabetics. One must have strong suspicion of thyroid dysfunction in patients with uncontrolled glycemic levels and must be evaluated for hyperthyroidism especially in young and middle aged diabetics with poor glycemic control. Significantly increased levels of triglyceride was observed in patients with thyroid dysfunction. Whereas high-density lipoproteins,total cholesterol, low-denstiy lipoproteins levels were not significantly raised. Thyroid dysfunctions impairs glycemic control in diabetic subjects Hyperthyroid patients had poor glycemic control.

INTRODUCTION

Diabetes being the most common endocrine metabolic disorder, there was curiosity to understand and learn the association of this with another common endocrine gland function that is thyroid gland. Diabetes mellitus and thyroid disorders are the two most common endocrinal disease conditions, which often occur with each other[1-2]. Association between both conditions have long been reported[3]. Studies reveal that hypothyroidism is the most commonly diagnosed thyroid dysfunction and has a greater implication for type-2 diabetes with pre-existing dyslipidaemia and the risk of cardiovascular disease is increased[4].

The association between these two disorders is long been recognized, although the prevalence of thyroid dysfunction in diabetic population varies widely between studies. With insulin and thyroid hormone being intimately involved in cellular metabolism and thus excess or deficit of one hormone results in functional derangement of the other. Enhanced sensitivity and specificity of Thyroid Stimulating Hormone (TSH) has greatly improved the assessment of thyroid functions[5].

Thyroid disease is a pathological state that adversely affects the glycemic control. Diabetes influences the thyroid function in two sites, one is at the level of hypothalamic control of Thyroid Stimulating Hormone (TSH) release and other is related to conversion of Tetraiodothyronine (T4) to Triiodothyronine (T3) in the peripheral tissue[6].

There are numerous lines of evidence to suggest that Type 1 diabetes mellitus is an autoimmune disorder. These include the presence of insulitis, presence of antibodies, auto-reactive T-cells against islet antigens, an association with some other known organ specific autoimmune diseases like thyroid disorders, pernicious anemia and a strong association has been found between HLA genes and lastly remission of the disease with immune-modulator therapy. Thus association between thyroid and Type 1 diabetics may be an auto-immune process[7].

Type 2 DM is a growing problem in our country and clinical findings showed that many patients are associated with thyroid dysfunction later in their life. Further, it is a well known fact that thyroid disorders affect females far more commonly than males, so getting a collective association between the thyroid dysfunctions in women who have already been diagnosed with type 2 diabetes or newly diagnosed cases, irrespective of their treatment status was considered worthwhile. Hence, this study was conducted to know prevalence of Thyroid Dysfunction in middle aged Type 2 DM women of child bearing age.

MATERIALS AND METHODS

The prospective observational study was conducted among middle aged female Patients with type 2 diabetes who will be visiting the OPD and admitted in wards of the Department of General medicine at K C General Hospital, Bangalore. Karnataka. Duration of study was from January 2019 to Aug 2020. The study has been approved by the Ethical committee of K C General Hospital, Bangalore.

Sample Size:

- the sample size calculation is $n=4pq/d^2$.
- P=prevalence=8.6% (based on previous studies).
- q=100-p=91.4.
- d=precision=6.

$=4 \times 8.6 \times 91.4/(6)$[2].

n = 87.

All the 87 eligible women with type 2 diabetes mellitus, who were fulfilling the inclusion and exclusion criteria underwent thyroid profile test, lipid profile, glycosylated HbA1c.

Inclusion Criteria: Middle aged women (30-50yrs) Diagnosed type 2 diabetes mellitus Patient willing to give informed consent.

Exclusion Criteria: Patients who were detected to have onset of daibetes before the age of 30yrs.

Patients on drugs known to affect thyroid functions(ex-amoidarone,lithium) or exogenous steroids/harmones know to effect blood sugar levels

Acutely ill critical patients.

Patients with known renal and hepatic and pancreatic disease.

Detail History with demography and clinical examination will be done.

If patient already on thyroid harmone preparations-dose and duration will be noted.

Acute and chronic complications of diabetes mellitus will be looked for Associated co-morbidities like hypertension, cardio vascular disease and details of drugs in use will be noted.

Screening for diabetes status,lipid profile and thyroid dysfunctions. Blood test will be done for ruling out hepatic and renal dysfunctions.

Laboratory Investigations:

Complete blood count.

FBS,PPBS,HbA1c.

Urine routine.

RFT to assess diabetic nephropathy Free T3,free T4,TSH levels.

Lipid profile LFT.

ECG.

2D ECHO.

Other investigation if required.

Method of Study: During the period of data collection 341 women were screened for Type 2 DM, out of which 26 were diagnosed with Type 2 DM on the basis

of American Diabetic Association criteria. Rest 116 women who were already a diagnosed case of Type 2 diabetes were seen in the place of study. All of them were screened with inclusion and exclusion criteria to get a total number of 87 eligible women. All the 87 eligible women with type 2 diabetes mellitus, who were fulfilling the inclusion and exclusion criteria were included in the study.

A detailed history was taken and examination done as per the proforma. All women in addition to hematological tests, underwent evaluation for thyroid status; assessment of serum FT3, FT4 and TSH levels. The laboratory evaluation of thyroid function was done by estimation of serum FT3, FT4 and TSH levels by chemi-luminescence assay method. Two ml of blood was drawn and centrifuged and serum collected from that was incubated with the reagent (separate for T3, T4 and TSH) for about 1 hour at room temperature. Later the readings were taken from the instrument COBAS 600.

The Normal Reference Range:

FT3 – 2.3- 4.2 Pg/ml.

FT4 – 0.89- 1.76 ng/dl.

TSH- 0.42- 4.5 µIU/ml/

Diabetic state of the women were estimated by analyzing Random blood sugar/Post-prandial blood sugar/Fasting blood sugar by glucose oxidase method, wherein 1 ml of blood was drawn and centrifuged to collect the serum, which was incubated with 1 ml of reagent at room temperature for 15 min. Later, the reading was taken from the instrument.

Patients were Diagnosed Based on the Following ADA Criteria for Diabetes:

- HbA1C >6.5%. The test should be performed in a laboratory using a method that is NGSP certified and standardized to the Diabetic control and complication trial (DCCT) assay.*
- OR
- FPG >126 mg/dl (7.0mmol/l). Fasting is defined as no caloric intake for at least 8 hours.*
- OR
- 2-h plasma glucose load of >200 mg/ dl (11.1 mmol/ l) during an OGTT. The test should be done as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*
- OR
- In a patient with classical symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose of >200 mg/ dl (11.1 mmol/ l).
- *In the absence of unequivocal hyperglycemias, criteria 1-3 should be confined by repeat testing.

Statistical Analysis: Collected data was entered in Excel Workbook in windows 8 Microsoft Office 2010 version Software Package in Computer and analysis was done using SPSS version 20. Frequency distribution tables, diagrams were made. Percentage, Proportions, Statistical averages, standard deviations were calculated as and when necessary. Chi-square test was done to test the differences of proportion with level of significance set at $p \leq 0.05$.

RESULTS AND DISCUSSIONS

During the period of data collection 341 women were screened for Type 2 diabetes mellitus, out of which 26 were diagnosed with Type 2 diabetes mellitus on the basis of American Diabetic Association criteria. Rest 116 women who were already a diagnosed case of Type 2 diabetes were screened. All the 87 eligible women with type 2 diabetes mellitus, who were fulfilling the inclusion and exclusion criteria were included in the study underwent thyroid profile test, lipid profile test, HbA1c.

A total of 87 subjects were included in the final analysis. The mean age was 44.25±4.81 years, ranged between 31-50 years in the study population.

Table 1: Descriptive Analysis of Duration of Diabetes Mellitus(in Years) in the Study Population (N=87)

Duration of diabetes mellitus(in years)	Frequency	Percentages
Up to5 years	64	73.56%
6to 10 years	21	24.14%
>10years	2	2.30%

In this analysis of cases according to their age, 3/4th patients were in 5th decade.

The mean Duration of DM was 4.68±2.23 years, ranged between 1-12 years in the study population.

In this study, patients were grouped according to the duration of diabetes mellitus into three groups, comprising those being diabetic for <5 years, those having for 6-10 years and those having for >10 years duration. Of the 87 cases, most of the cases(64) were diabetics for <5 year duration.

Table 2: Range and Mean±2 SD of Fasting and Postprandial Blood Sugar and HbA1c of Cases Under Study.

Parameter	Mean ±SD	Minimum	Maximum
FBS/Mg%	137.89±32.64	87.00	333.00
PPBS/Mg%	214.44±75.81	109.00	450.00
HbA1C%	7.65 ±1.99	4.5	12

In this present study It was found that, fasting blood sugar had range from 87 mg/dl to 333 mg/dl and Mean±2SD of 137.89±32.64.postprandial blood sugar ranged from 109 mg/dl-450 mg/dl with the Mean±2SD of 214.44±75.81. Range and Mean±2SD of HbA1c was found to be 4.5-12 and 7.65±1.99 respectively.

Table 3: Descrptive Analysis of Degree of Control of Sugar levels in Study Population Based on HbA1c Levels

HbA1c	Degree of control	No of patients in study population(N=87)
<7	Fair controlled	38 (43.68%)
7-8	Moderately controlled	17 (19.54%)
>8	Poorly controlled	32(38.78%)

Table 4: Range and Mean±2 SD of T4, T3 and TSH of Cases Under Study

Parameter	Mean±SD	Minimum	Maximum
FT4ng/dl	1.19 ±0.76	0.20	5.80
FT3pg/ml	2.8±1.33	1.10	11.20
TSHmcIU/ml	16.15±25.24	0.001	100.00

Range and Mean±2SD of FT4 was found to be 0.2-5.80ng/dl and 1.19±0.76 respectively. Range and Mean±2SD of FT3 was found to be 1.1-11.20 pg/ml and 2.8±1.33 respectively. Range and Mean±2SD of TSH was found to be 0.001-100 mcIU/ml and 16.15±25.24 respectively.

Table 5: Range and Mean±2 SD of Lipid Profile of Cases Under Study

Parameter	Mean±SD	Minimum	Maximum
Cholesterol	153.79±68.96	89.00	355.00
TG	235.18±95.36	113.00	564.00
LDL	114.47±31.68	75.00	345.00
HDL	44.28 ±5.02	32.00	65.00

Range and Mean±2SD of cholesterol is found to be 89-355 and 153.79±68.96 respectively. Range and Mean±2SD of triglyceride is found to be 113-564 and 235.18±95.36 respectively. Range and Mean±2SD of low-density lipoprotein is found to be 75-345 and 114.47±31.68 respectively. Range and Mean±2SD of high-density lipoprotein is found to be 32-65 and 44.28±5.02 respectively.

Of all the cases, 4 (4.6%) patients were exclusively on insulin therapy, 12 (13.79)% on insulin plus oral hypoglycemic agent/s and 71 (81.61)% on oral hypoglycemic agent/s only.

Patients only on oral hypoglycemic agent/s constituted the maximum number with 81.61% of all cases.

Table 6: Comparison Between Treatment and Fasting Blood Sugar Control (N=87)

	Fasting Blood Sugar Control	
Treatment	FBS≥126	FBS<126
INS(N=4)	1(25%)	3 (75%)
INS+OHA(N=12)	6(50%%)	6 (50%)
OHA(N=71)	45(63.38%)	26(36.62%)

In this study, patients underwent fasting blood sugar (FBS) examination and the relation of fbs control with respect to the treatment protocol was analysed. Here, FBS <126 mg/dl was considered euglycemic and ≤126 was considered to be hyperglycemic. Accordingly, it was found that 1 (25%) patient only on insulin therapy were hyperglyciemic, remaining 3 patients i.e 75% of patients under study on exclusive insulin therapy were euglycemic.

Total cases on combined insulin plus oral hypoglycemic agent/s were 12. Of these 12 cases,6 cases i.e. 50% cases were hyperglycemic and 50% patients were euglycemic. Total cases only on oral hypoglycemic agent/s were 71, of which 63.38% of patients were hyperglycemic and 36.62% patients were euglycemic. Overall, out of all the 87 diabetic patients under study and treatment, 59.77% of the patients had uncontrolled fasting blood sugar level whereas 40.23% had controlled Fbs.

Table7: Treatment Protocol and Post-Prandial Blood Sugar Control

	Post-Prandial Blood Sugar Control	
Treatment	Hyperglycemic (≥180)	Euglycemic (<180)
INS(N=4)	3 (75%)	1(25%)
INS+OHA(N=12)	8(66.66%)	4(33.33%)
OHA(N=71)	45(63.38%)	26(36.62%)

In this study, patients underwent post-prandial blood sugar (ppbs) examination and the relation of PPBS control with respect to the treatment protocol was analysed. Here, ppbs <180 mg/dl was considered euglycemic and ≥180 was considered to be hyperglycemic. Accordingly, it was found that among 4 patients who were only on insulin therapy 3 were hyperglyciemic, i.e. 75% of patients under study on exclusive insulin therapy had uncontrolled ppbs and 1(25%) patient out of 4 who were on exclusively on insulin was euglycemic. Total cases on combined insulin plus oral hypoglycemic agent/s were 12. Of these 12 cases, 8(66.66%)cases were hyperglycemic and 4 cases(33.33%) of all patients were euglycemic. Total cases only on oral hypoglycemic agent/s were 71, of which 45(63.38%) of patients were hyperglycemic and 26(36.62%) patients were euglycemic. Overall, out of all the 87 diabetic patients under study and treatment, 64.37% of the patients had uncontrolled post-prandial blood sugar level whereas only 35.63% had controlled ppbs.

Among the people with T4 levels, 20 (22.99%) participants were <0.89 ng/dl, 62 (71.26%) participants were 0.89 to 1.76 ng/dl and 5 (5.75%) participants were >1.76 ng/dl. (Table 8 and Figure 1).

Table 8: Descriptive Analysis of FT3 Level in the Study Population(N=87)

FT3 Level	Frequency	Percentages
<2.30	20	22.99%
2.30-4.2	64	73.56%
>4.2	3	3.45%

Among the people with T3 levels, 20 (22.99%) participants were <2.30 ng/dl, 64 (73.56%) participants were 2.30 to 4.20 ng/dl and 3 (3.45%) participants were >4.20 ng/dl.

Among the people with TSH levels, 3 (3.45%) participants were <0.42 mIU/mL, 57 (65.52%)

participants were 0.42 to 4.50 mIU/mL and 27 (31.03%) participants were >4.50 mIU/mL. Among 27 raised TSH level patients 19 had T3,T4 leveles <normal levels and 8 had with in the normal range.

Table 9: Prevalence of Thyroid Days Function in Diabetes

Thyroid Disorders	Frequency	Percentages
Hyperthyroidism	3	3.45%
Hypothyroidism	19	21.84%
subclinical hypothyroidism	8	9.20%
Normal	57	65.52%

Among the study population, 3 (3.45%) participants had hyperthyroidism, 19 (21.84%) participants had hypothyroidism and 8 (9.20%) participants had subclinical hypothyroidism.

In this study, 87 established diabetics where screened for thyroid disorders by Thyroid function test (TFT), which constituted FT3, FT4 and TSH biochemical essays. Abnormal thyroid function was found in 30 Type 2 diabetes mellitus cases and remaining 57 diabetics had normal thyroid function. Of the 30 cases with altered thyroid function, they were further divided into three categories. The three categories were, subclinical hypothyroidism, hypothyroidism and hyperthyroidism. Here, among 30 cases with thyroid dysfunction, 8 patients with sub-clinical hypothyroidism.

19 patients with overt hypothyroidism was noted and 3 cases had hyperthyroidism.

The prevalence of thyroid dysfunction in older age group (41-50) was more than younger age group (30-40). Among total 19 hypothyroidism patients 15 patients (78.94%) were having age between 41-50. Among 8 subclinical hypothyroidism patients 6(75%) were in age group of 41-50.out of 3 hyperthyroidism 2(66.66%) were in older age group 41-50years.

In this study, 87 cases were divided into 3 groups according to the duration of diabetes. Three groups according to duration of diabetes were, 0-5 years, 6- 10 years and >10 years. 64 cases were in the duration of 0-5 years, 21 cases were in category of 6-10 years and the remaining 02 cases had diabetes for duration of >10 years.

Here, number of cases with duration of diabetes 0-5 years were 64 in total, of which 23 patients had thyroid dysfunction i.e 35.9% cases had thyroid dysfunction in this group. Of these 23 patients, 15(65.22%) patients had overt hypothyroidism and 5(21.74%) patients had sub-clinical hypothyroidism and 3(13.04%) patients had hyperthyroidism.

The number of cases with duration of diabetes 6-10 years were 21 in total, of which 7 patients had thyroid dysfunction i.e. 33% cases had thyroid dysfunction in this group. Of these 7 patients, 4 patients(57.14%) had overt hypothyroidism and 3 (42.86%) patients had sub-clinical hypothyroidism. None of the patient had hyperthyroidism.

The number of cases with duration of diabetes >10 years were 02 in total, of which none of the patient had thyroid dysfunction.

In this present study, that increased duration of diabetes caused no increase in occurrence of thyroid dysfunction.

Out of 87 patients with diabetes, symptoms of thyroid disorder were present in 6 patients of which, 4 out of 19 patients with hypothyroidism and 2 patient out of 3 hyperthyroidism. The symptoms with which the patients with hyperthyroidism presented were heat intolerance, sweating, palpitations, fatigue, weakness, increased appetite and menstrual disturbances. Only sign noted was fine tremors in 1 patient. hypothyroidism patients were relatively presented with less symptoms. only 4 of 19 patients had symptoms mainly had polymenorrhagia, dry skin.

In this study all cases underwent HbA1c examination of which 32 had HbA1%c >8. Among these 32 patients, hypothyroidism was present in 10 patients and sub-clinical hypothyroidism in 6 patients. All 3 hyperthyroidism patients had HbA1c above 10. Among 32 poorly controlled diabetic patients 19(59.4%) patients had thyroid dysfunction Lipid profile in patients with hypothyroidism in present study showed triglycerides to be high, whereas the other parameters like total cholesterol, high density lipoprotein, low density lipoprotein were within normal range.

The means and standard deviations are shown in the table below comparing them with Diabetics.

Among the people with T2DM and hypothyroidism, the mean fasting blood sugar, postprandial blood sugar, total cholesterol, triglycerides, LDL-C and HDL-C was 148.63 ± 47.91, 252.47 ± 81.02, 164.11 ± 73.12, 243.32 ±75.25, 114 ± 8.68 and 43.95 ± 4.1 respectively.

A total of 87 type 2 diabetics were studied. All were confirmed diabetics who previously had fasting plasma glucose levels of >126 mg/ dl or RBS of $\geq$200 mg/dl on more than one occasion and were receiving treatment such as Insulin, OHA's or both.

In this study of 87 female patients it was found that 30 patients were with thyroid dysfunction that is 34.48%, which is similar to a number of studies previously done that is a higher than normal prevalence of thyroid disorders occurs in patients with type 2 diabetes.

A. R. M. Radaideh et al (Jordon study),2004, a study reported that thyroid dysfunction was present in 12.5% of type 2 diabetic patients[8].

C. E. J. Udiong, in his study from Nigeria found that prevalence of thyroid disorder was 46.5% of which hypothyroidism was present in 26.6%[9]. Gurjeet Singh *et al*,2011 in his study found that, 30% had abnormal

Table10: Thyroid Days Function in Relation to Duration of Diabetes

Duration of DM	No. of patients	Hypothyroidism	Sub-clinical Hypothyroidism	Hyperthyroidism	Total%
0-5 years	64	15(23.4%)	05(7.8%)	03(4.68%)	35.8
6-10years	21	04(19%)	03(14%)	00(0%)	33%
>10years	02	00	00	00	00

thyroid hormone levels (23.75% had hypothyroidism and 6.25% had hyperthyroidism). It revealed different grades of thyroid dysfunction among diabetics. Hypothyroidism was present in 23.75% (15% subclinical hypothyroidism and 8.75% primary hypothyroidism) and hyperthyroidism was present in 6.25% (all primary hyperthyroidism) of diabetic subjects[10].

Vinu Vij *et al*, 2012, studied the prevalence of thyroid dysfunction in patients of Type II diabetes mellitus. They found that out of the 80 type II diabetic subjects studied, 28.75% showed abnormal thyroid function (22.50% had hypothyroidism and 6.25% had hyperthyroidism)[50].

Fauzia Moslem *et al*, 2015, carried out cross-sectional study to explore the prevalence of thyroid dysfunction among type-2 diabetes patients attending a specialist diabetes centre. In this study it was found that prevalence rate of thyroid dysfunction was 10%[53].

Jain G *et al*, 2016, conducted a study to find out the prevalence of thyroid disorders in patients of type 2 diabetes mellitus. It was found that there was a high prevalence (16%) of thyroid disorders in patients of type 2 diabetes mellitus[54].

Happy chutia *et al*,2018 reported that Among 80 patients, 20 (25%) were found to be hypothyroid, 4 (5%) were hyperthyroid and 56 (70%) were found to be euthyroid. The prevalence of thyroid dysfunction is found to be 30% among the patients with diabetes[11]

Valerie Witting *et al*, 2014 in his study found that out of all diabetes patients 27.3% had a thyroid disorder with more women (62.2%) being affected (p<0.001). Thyroid disease was predominantly diagnosed after diabetes onset[12]. In the present study also occurance of thyroid dysfunctions were much later than diabetes onset.

In the present study out of the 30 female patients had thyroid dysfunction 19(63.3%) had hypothyroidism, 8(26.6%) had sub-clinical hypothyroidism and 3(10%) had hyperthyroidism. None of these patients had sub-clinical hyperthyroidism. 3/4th of these patients with thyroid dysfunction belongs to the older age group of 41-50 years. Among 19 hypothyroid patients 15(78.9%),out of 8 sub clinical hypothyroidism patients 6(75%) belongs to this older (41-50) age group.

Glycemic status is influenced by insulin, which is known to modulate TRH and TSH levels. In this present study 3 patients had hyperthyroidism and all of them had poor glycemic control with HbA1c >10.

Thyroid harmone causes increased insulin secretion, however it antagonises the peripheral action of insulin there by increases insulin resistance. Because of increased metabolic activity in hyperthyroid there is increased glucose output due to gluconeogenesis, glycogenolysis and increased insulin catabolism.

In this present study clinical features suggestive of thyroid hyperactivity in the form of heat intolerance, sweating, palpitations, fatigue/weakness, increased appetite and menstrual disturbances (oligomenorrhagia) was observed in all compared to hypothyroidism group where only few presented with polymenorrhagia, dry skin.

Not many papers regarding clinical features of thyroid disorders in T2DM are present. Udiong[1] have reported similar observation in their study on clinical examination.

Both diabetes and thyroid dysfunctions have been found to be a common cause of primary and secondary infertility among females. None of the patient in study group were nulliparous. All of them had child before getting included into the study

Strong association between T2DM and thyroid disorders has been well documented. In the present study hypertriglyceridemia was seen in 23 of the 30 thyroid dysfunction patients across all spectrum. raised total cholesterol, LDLC, reduced HDLC not observed in this present study.

Pasupathi *et al* in their study found that there were increased levels of triglycerides and LDL-C and reduced level of HDL-C in diabetics.

Increased levels of total and LDL cholesterol,increased apolipoprotiens and IDL reported in some studies was not found in present study.

There is reduced lipoprotein lipase activity seen in hypothyroidism patients which contributes to increased levels of triglycerides[13].

CONCLUSION

Prevalence of thyroid dysfunction was seen in 34.48% of middle aged Indian female patients with type 2 diabetes mellitus, of which 21.84% had hypothyroidism., 9.20% had sub-clinical hypothyroidism and 3.45% had hyperthyroid In this study, prevalence of thyroid dysfunction were higher among age group of 41-50 years than 31-40 years age group of Indian female diabetics 32 patients had poor glycemic Control (HbA1c% >8) even with treatment; among them 10 patients had hypothyroidism and 6 patients had sub-clinical hypothyroidism, 3 patients had hyperthyroidism A serum TSH within euthyroid range almost always eliminates the diagnosis of hypothyroidism or hyperthyroidism. This shows that TSH is preferred screening test for thyroid dysfunction

in diabetics. One must have strong suspicion of thyroid dysfunction in patients with uncontrolled glycemic levels and must be evaluated for hyperthyroidism especially in young and middle aged diabetics with poor glycemic control. Significantly increased levels of triglyceride was observed in patients with thyroid dysfunction. Whereas high-density lipoproteins, total cholesterol, low-denstiy lipoproteins levels were not significantly raised. Thyroid dysfunctions impairs glycemic control in diabetic subjects Hyperthyroid patients had poor glycemic control.

REFERENCES

1. Sanjay, K., 2014. Recent advances in endocrionology. Thyr disor diab., 64: 966-968.
2. Hage, M., M.S. Zantout and S.T. Azar, 2011. Thyroid disorders and diabetes mellitus. J. Thyroid Res., Vol. 2011 .10.4061/2011/439463.
3. Feely, J. and T.E. Isles, 1979. Screening for thyroid dysfunction in diabetics.. BMJ, 1: 1678-1678.
4. Jennal, L.J., 2006. Diabetes Control in Thyroid Disease. Diab Spec., 19: 148-153.
5. Sathish, R. and V. Mohan, 2003. Diabetes and thyroid diseases-A Review. Int. J. Diab. Dev. Coun., 23: 120-123.
6. Calderon, A.P., C. Champagne, S. Garigen, S. Mousa and R. Block, 2012. Fish oil metabolites: Translating promising findings from bench to bedside to reduce cardiovascular disease. J. Glyco amp Lipid., Vol. 2, No. 1 .10.4172/2153-0637.1000104.
7. Patricia, W., 2000. Thyroid Diseases and Diabetes.Clinical Diabetes. Winter, Vol. 18, No. 1.
8. Radaideh, A.R., M.K. Nusier, F.L. Amari, A.E. Bateiha and M.S. El-Khateeb,et al., 2004. Thyroid dysfunction in patients with type 2 diabetes mellitus in Jordan. Saudi Med J., 25: 1046-1050.
9. Udiong, C.E.J., A.E. Udoh and M.E. Etukudoh, 2007. Evaluation of thyroid function in diabetes mellitus in calabar, Nigeria. Indian J. Clin. Biochem., 22: 74-78.
10. Gurjeet, S.V., A.K. Gupta and N.G. Sharma, 2011. Frequency of thyroid dysfunction among diabetes in Punjabi population. Adv. Biores., 2: 3-9.
11. Gupta, S., M. Verma, A.K. Gupta, A. Kaur, V. kaur and K. Singh, 2011. Are we using thyroid function tests appropriately? Indian J. Clin. Biochem., 26: 178-181.
12. Witting, V., D. Bergis, D. Sadet and K. Badenhoop, 2014. Thyroid disease in insulin-treated patients with type 2 diabetes: A retrospective study. Thyroid Res., Vol. 7, No. 2 .10.1186/1756-6614-7-2.
13. Chutia, H., H. Bhattacharyya, A. Ruram, K. Bora and M. Chakraborty, 2018. Evaluation of thyroid function in type 2 diabetes in north-eastern part of India: A hospital-based study. J. Family Med. Primary Care, 7: 752-755.