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Original Research Paper

General Medicine

PREVALENCE OF THYROID DYSFUNCTIONS IN TYPE 1 DM, TYPE 2 DM, LOW BODY WEIGHT TYPE 2 DM AND GDM PATIENTS IN BUNDELKHAND REGION- A HOSPITAL BASED STUDY IN MAHARANI LAXMI BAI MEDICAL COLLEGE, JHANSI

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ABSTRACT **Background:** DM and thyroid disorders mutually influence each other so excess or deficiency of one can result in functional derangement of other. **Material and Method:** This was a prospective observational study of thyroid dysfunction in diabetic patients over a period of 1.5 years: Biochemical markers of diabetes and thyroid dysfunction, namely HbA1c, PPBS, FBS, FT4 and TSH were measured in all patients. **Results:** A total 120 patients of different type of DM were studied. In our study most of cases was type-II DM (41.6%), followed by LBW type II DM (25%), DM Type 1 (25%) and 8.3% of GDM. Most of the cases were male (54.16%) and rest cases were female. Most of cases were in age group of 41 to 60 year of age (50%) followed by 21 to 40 (26%), 61-80 (22%). In our study more thyroid dysfunction was found in diabetic patients (32.6%) in comparison to non diabetic (16%), among which subclinical hypothyroidism (19.17%) more common than hypothyroidism and hyperthyroidism (4.16%). Patients with type I DM had more prevalence of thyroid dysfunction (43.33%) followed by DM type II (36%) and LBW DM type II (23. 3%) in comparison to control (16%) and in all type of diabetics, sub clinical hypothyroidism was more prevalent. Among diabetic subjects with SCH and hypothyroidism had proportion of dyslipidemia, hypercholesterolemia (47.82% and 63.63% versus 25.93%) in comparison to euthyroid patients. Similarly for hypertriglyceridemia (43.48% and 81.82% versus 32%) and for increase LDL (26.08% and 54.55% versus 14.81%). In our study, the subject with duration of diabetes of 6 month to 5 years and more than 5 years had higher prevalence SCH (43.8% and 47.83 Versus 8.70%) in comparison to <6 month of duration. Similarly for hypothyroidism (27.27% and 54.55% versus 18.18%). **Conclusion:** Thyroid dysfunction is more prevalent in diabetics in comparison to normal population in which type I had more prevalent followed by type II DM and LBW type II DM. Patients having thyroid dysfunctions also have dyslipidemia and as the duration of diabetes increases, prevalence of thyroid dysfunction increases.

KEYWORDS :- LBW DM-II, Thyroid dysfunction, Hypothyroidism, Subclinical Hypothyroidism (SCH), TG, TCH, DM, LDL, HDL,

INTRODUCTION

Diabetes Mellitus (DM) has emerged as pandemic health problem in the world and it is a common endocrine disorder, which has reached 20% in urban population and 10% in rural population in India. The prevalence of thyroid dysfunction in DM is increasing alarmingly. The World Health Organization (WHO) has projected that the global prevalence of diabetes will increase to 300 million (7.8%) in 2030[1].The International Diabetes Federation projects that 592 million individuals will have diabetes by the year 2035. The prevalence of type 2 Diabetes Mellitus (DM) is also rising in younger individuals presumably because of increasing obesity and reduced activity levels as countries become more industrialized[2].

NIDDM is the most prevalent form of diabetes mellitus (DM) in India. About one fourth of these diabetics have a body mass index (BMI) below 19, i.e. low bodyweight Type 2 DM (LB Type 2 DM). They are neither protein deficient nor belong to a poor socio-economic class. LB Type 2 DM more often presents with peripheral neuropathy and infections than coronary artery disease (CAD), hypertension or nephropathy. They achieve good glycemic control with sulphonylurea therapy. LB Type 2 DM patients have severe basal hyperglycemia with low circulating levels of insulin while C-peptide levels are similar to those of patients with classic Type 2 DM. Autoimmune destruction of beta-cells is not the cause of hypoinsulinemia as levels of islet cell and anti-glutamic acid decarboxylase (GAD) antibodies are similar to those in patients with classical Type 2 DM and much lower than those in Type 1 DM[3].

Thyroid hormones are insulin antagonists, both insulin and thyroid hormones are involved in cellular metabolism. Excess or deficit of any one can result in functional derangement of the other. Sub–clinical hypothyroidism is an independent risk factor for development of diabetic nephropathy. Serum TSH and tissue insulin sensitivity have important effects on serum lipid parameters in type 2 diabetic patients. At low insulin sensitivity, relatively minor changes in TSH levels are associated with marked changes in lipid risk factors and thus cardiovascular risk. Unrecognized thyroid dysfunction may impair metabolic controls in patients with diabetes and in addition may amplify existing cardiovascular risk. Recognition and treatment of thyroid dysfunction in diabetic patients will benefit glycaemic control, attenuate cardiovascular risk, and improve general well being[4]

The association between diabetes and thyroid dysfunction were first published in 1979. Thyroid dysfunction is a disorders of the thyroid gland which manifests either as hyper - or hypothyroidism and is reflected in the levels of thyroid stimulating hormone (TSH)[5].

Thyroid diseases and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice which have been shown to mutually influence each other. Thyroid hormones contribute to the regulation of carbohydrate metabolism and pancreatic function and on the other hand, diabetes also affects thyroid function tests to a variable extent. However, underlying thyroid disorders may go

undiagnosed because the common signs and symptoms of thyroid disorders are similar to those for diabetes and can be overlooked or attributed to other medical disorders. The recognition of this interdependent relationship between thyroid disease and diabetes is of importance to guide clinicians on the optimal management of both these conditions[6].

Diabetes mellitus and thyroid dysfunction are the most common endocrine diseases seen in the adult population, while insulin or thyroid hormones metabolism can result in functional abnormalities of one another. The strong link between diabetes and thyroid diseases encouraged the American Diabetes Association (ADA) to propose that people with diabetes must be checked periodically for thyroid dysfunction. Thyroid disease should be screened annually in diabetic patients to detect asymptomatic thyroid dysfunction. At the same time, patients with thyroid dysfunction may need to be tested for the possibility of abnormal glucose metabolism, since excessive thyroid hormones cause increased glucose production in the liver, rapid absorption of glucose through the intestine, and increased insulin resistance[7].

The thyroid gland is one of the endocrinal systems of the human body and can be affected by sustained hyperglycemia and the continuous endeavors by the body to correct for this carbohydrate imbalance. Diabetic patients have susceptibility to different types of thyroid dysfunction, whether hypothyroidism or hyperthyroidism; at the same time, patients with thyroid dysfunction are susceptible to suffer from either Type 1 diabetes or Type 2 diabetes. Thyroid disorder is divided into clinical and subclinical disease, according to the hormonal levels and clinical presentation that will affect the follow-up and management plan[7].

AIMS AND OBJECTIVES

1. To determine the prevalence of thyroid dysfunction in different types of diabetes mellitus patients based on biochemical and clinical features.
2. To determine the prevalence of thyroid dysfunction in diabetic patients with respect to age/sex and duration of diabetes.

MATERIALS AND METHODS

Source of data:

This study includes all type of diabetic patients from OPD'S and IPD'S of Departments of General Medicine, M.L.B Medical College, Jhansi (U.P.). This study includes all type of diabetic's patient's irrespective of age and sex, Minimum number of 170 subjects were selected for the study. The study will be conducted from March 2018 to Oct 2019 in all patients of DM having diabetes in accordance with ADA criteria -2017.

Inclusion criteria for study subject

1.Any patient who had diagnosed to have diabetes mellitus according to ADA guidelines.

- Symptoms of diabetes plus RBS 200mg/dl
- Fasting plasma glucose 126 mg/dl
- Two hours glucose 200mg/dl during an oral glucose tolerance test.
- HbA1C 6.5%

2. All diabetics irrespective of glucose control.
3. All diabetics irrespective of treatment (OHA/insulin).
4. All diabetic patient who had proven pre-existing thyroid dysfunctions.
5. All patients with gestational diabetes mellitus.

The criteria for diagnosis of GDM according to IADPSG guideline by using 75gm OGTT.

a. Fasting Plasma Sugar 92mg / dl
b. After one hour 180mg/dl
c. After two hours 153mg/dl.

Exclusions Criteria

- Drug induced diabetes .
- Secondary causes of DM (Chronic pancreatitis, acromegaly, Pheochromocytoma)
- Proven case of thyroid malignancy
- Patients with drug induced thyroid dysfunctions.
- Critically ill patients with complications of DM

Methodology

After taking the history in details and clinical examination was performed with special reference to thyroid gland.

1. All clinical findings were noted in the proforma.
2. All patients underwent laboratory evaluation.
3. Diabetes status of the patients were estimated by analyzing FBS, PPBG, RBS and HbA1c(Bio-Rad D-10TMHbA1c-based on High performance liquid chromatography)

Statistical analysis:

All the data was initially entered to Microsoft Excel 2019 and later these Spreadsheets were used for analysis. Statistical analysis was done by using SPSS version 20.0.

- Descriptive statistics were calculated as frequency, percentage, mean and standard deviation. Descriptive data were represented using various tables, graphs, diagrams etc.
- For all the statistical tests of significance, p value of <0.05 was considered to reject the null hypothesis.
- Student "t" test was done to test the difference in means between the study group and the control group. m

ANOVA test was done to test the difference in means between more than 2 groups.

For categorical nominal variables, Chi-square test was done to test the association between the variables.

RESULT

The study was conducted on 170 cases (120 cases in study group and 50 in control group) after obtaining informed consent and following observations were made:

Table 1: Age wise distribution of total study population (n=170)

Age (yrs)	Study group		Control group	
	No	%	No	%
20	11	9.16%	1	2%
21-40	19	15.84%	13	26%
41-60	60	50%	25	50%
61-80	30	25%	11	22%
Total	120	100%	50	100%
MeanSD	48.4317.23	48.0613.70		

About 50% of the study population was in age group 41-60 yrs while 25% were in age group in 61-80 yrs, the study group not significantly different from control group in age distribution (p value > 0.05).

Table 2: Distribution of study population according to their gender.

Sex	Study group		Control group	
	No.	%	No	%
Male	65	54.16%	36	72%
Female	55	45.83%	14	28%

Total	120	100%	50	100%

Majority of study subjects were Male 65 (54.16%) while 55 (45.84%) were females. The control group had more male than study group.

Table 3: Distribution of study population on the basis of type of DM.

DM Type	Male		Female		Total
	No. of patients	%	No. of patients	%	
Type-I DM	19	63.33%	11	36.66%	30
Type-II DM	27	54.00%	23	46.00%	50
LBW Type-II DM	19	63.33%	11	36.33%	30
GDM	0	0%	10	100%	10

In the whole of the study group, majority of patients were found of DM Type-II i.e. 50 followed by Type-I DM and LBW Type-II DM i.e. 30, and 10 patients were found of GDM.

Table 4: Distribution of Subjects according to their BMI.

BMI	Diabetic group		Control Group	
	No. of patients (n=120)	%	No. of patients (n=50)	%
Underweight (< 18.5)	41	34.17%	1	2%
Normal weight (18.5-22.9)	35	29.17%	7	14%
Overweight (23-24.9)	19	15.83%	12	28%
Obese (25)	25	20.83%	30	60%
Total	120	100%	50	100%

The difference in the distribution of overweight and obese individual across groups were not statistically significant.

Table 5: Distribution of various thyroid parameters in study group and control group (N=170).

Thyroid Biochemical Parameters		Study Group (n=120)		Control Group (n=50)		P-value
		No.	%	No.	%	No.
Free T4 (ng/dl)	Low (<0.89)	20	16.67%	7	14%	>0.05
	Normal (0.89-1.76)	94	78.33%	43	86%	
	High (>1.76)	6	5.00%	0	0%	
TSH (IU/ml)	Low (<0.4)	5	4.17%	0	0%	<0.05
	Normal (0.4-4)	81	67.50%	41	82%	
	(High) >4	34	28.33%	9	18%	

Subjects in study group who had diabetes had higher proportion of subjects in the low and high FT4 group 26 cases (20.84%) compared to the control group 7 (14%) but this difference was not statistically significant (p > 0.05).

Subjects in the study group had higher proportion of subjects in the low and high TSH group 39(32.50%) than control 9 (18%) and this difference was statistically significant (p-value :< 0.05).

Table 6: Distribution of thyroid status in study population (N=170).

Classification	STUDY GROUP		CONTROL GROUP		Total
	No. of patients (n=120)	%	No. of patients (n=50)	%	
Normal	81	67.50%	42	84%	123
Thyroid dysfunction	39	32.5%	8	16%	47
Total	120	100%	50	100%	
	Chi2 = 4.803		p-value = 0.028		

The prevalence of thyroid dysfunction among subjects in study group who had diabetes was 39 (32.5%) while it was 8 (16%) in control group.

Considering the prevalence of thyroid dysfunction among subjects in study group who had diabetes than the control, the difference in prevalence (32.5% vs. 16%) was statistically significant (p-value < 0.05).

Table 7: Distribution of thyroid dysfuntions in study and control group (N=170)

Classification	STUDY GROUP		CONTROL GROUP		Total
	No. of patients (n=120)	%	No. of patients (n=50)	%	
Normal	81	67.50%	42	86%	123
Subclinical Hypothyroidism	23	19.17%	6	12%	29
Hypothyroidism	11	9.17%	2	4%	13
Hyperthyroidism	5	4.17%	0	0%	5
Total	120	100%	50	100%	

Subjects in study group who had diabetes had higher proportion of subject with subclinical hypothyroidism 23 (19.17%) and clinical hypothyroidism 11 (9.17%) compared to control but this difference was not statistically significant (p-value > 0.05).

But as whole when considering the prevalence of thyroid dysfunction among subjects in study group who had diabetes than control, the difference in prevalence (32.5% vs. 16%) was statistically significant (p-value < 0.05).

Table 8: Gender distribution according to thyroid status among diabetic subject in the study group (n=120)

THYROID STATUS	GENDER			
	Male (n=65)		Female (n=55)	
	No.	%	No.	%
Normal (0.4-4.0 IU/ml)	45	69.23%	36	65.45%
Subclinical Hypothyroidism (> 4-10IU/ml)	12	18.46%	11	20.00%
Hypothyroidism (>>10 IU/ml)	4	6.15%	7	12.73%
Hyperthyroidism (<0.4IU/ml)	4	6.15%	1	1.82%
Total	65	100	55	100

Among the study subject who had diabetes, female had higher portion of subclinical hypothyroid and clinical hypothyroid (20% and 12.7% vs. 18.46% and 6.15%) this difference was not statically significant (p-value > .05) but

hyperthyroid was more common in male (6.15% vs. 1.8%).

Table9: Age wise distribution of thyroid status among diabetic subject in the study group (n=120).

Thyroid status	AGE OF STUDY SUBJECT						
	< 30 yrs		30-60 yrs		> 60 yrs		Total
	No.	%	No.	%	No.	%	
Normal (0.4-4.0 IU/ml)	15	18.51 %	51	62.96%	15	18.51%	81 (100%)
Subclinical Hypothyroidism (> 4-10IU/ml)	3	13%	10	43.47%	10	43.47%	23 (100%)
Hypothyroidism (>10 IU/ml)	2	18.18 %	3	22.27%	6	54.54%	11 (100%)
Hyperthyroidism (<0.4IU/ml)	1	20%	1	20%	3	60%	

Table 10: Distribution of thyroid status according to duration of diabetes in the study group (n=120).

Thyroid status	TIME DURATION OF DM						
	< 6 months		6 months - 5 yrs.		> 5 YRS.		Total
	No.	%	No.	%	No.	%	
Normal (0.4-4.0 IU/ml)	15	18.52%	51	62.96 %	15	18.52 %	81 (100%)
Subclinical Hypothyroidism (> 4-10IU/ml)	2	8.70%	10	43.48 %	1	47.83 %	23 (100%)
Hypothyroidism (>10 IU/ml)	2	18.18%	3	27.27 %	6	54.55 %	11 (100%)
Hyperthyroidism (<0.4IU/ml)	1	20%	1	20%	3	60%	

p-value : 0.0348

Among the study subjects who had diabetes, subclinical hypothyroid and clinical hypothyroid were more prevalent in subject >30yrs of age and prevalence increases as age was increases and this relation was statistically significant (p-value < 0.05).

Table 11: Distribution of thyroid dysfuntion in different types of DM subjects in study group (n = 120).

Classification	Type of diabetes								TOTAL
	DM Type I (N=30)		DM Type II (N=50)		LBW DM-II (BMI < 19) (N=30)		GDM (N=10)		
	No.	%	No.	%	No.	%	No.	%	
Normal (0.4-4.0 IU/ml)	17	56.67 %	32	64.00%	23	76.67 %	9	90%	81
Subclinical Hypothyroidism (> 4-0IU/ml)	7	23.33 %	12	24.00%	4	13.33 %	0	0%	23
Hypothyroidism (>10 IU/ml)	4	13.33 %	4	8.00%	2	6.67 %	1	10%	11
Hyperthyroidism (<0.4IU/ml)	2	6.67 %	2	4.00%	1	3.33 %	0	0%	5
Total	30	100%	50	100%	30	100%	10	100 %	120
Hyperthyroidism (<0.4IU/ml)	1	20%	1	20%	3	60%	5 (100%)		

p-value : 0.018

Among study subjects with diabetes, who had a duration of diabetes of 6 month 5 yrs and >5 yrs, had a higher prevalence of subclinical hypothyroidism (43.48% and 47.83% Vs 8.70%) in comparison to duration of DM < 6 Month.

Similarly which had duration of DM was 6 month- 5 yrs and >5 yrs, had prevalence of clinical hypothyroidism (27.27% and 54.55% Vs 18.18%) in comparison to duration of DM <6 Month, and this was statistically significant (p<0.05). Hence above study show that as the duration of DM increase, the prevalence of thyroid dysfunction increase.

Among the study subjects with Type -1 DM had more prevalence of thyroid dysfuntions (43.33 %) in comparison to others type of DM (Type -2 DM =36%, LBW Type-2 DM =23.3%, GDM = 11%) And Control group (16 %). In which Subclinical hypothyroidism (23.33%) is more prevalent than Clinical Hypothyroidism (13.3%) and this was statistically significant (p< 0.05).

Among the study subjects with Type -2 DM (BMI ≥19) had also more prevalence of thyroid dysfuntions (36%) in comparison to LBW Type-2 DM =23.3% , GDM = 11%) And Control group (16 %). In which Subclinical hypothyroidism (24%) is more prevalent than Clinical Hypothyroidism (8%) and this was statistically significant (p<0.05).

Among the study subjects with LBW Type-2 DM (BMI <19) had also more prevalence of thyroid dysfuntions (23.3%) in comparision to Control group (16%), but lower than Type-1 DM (43.33%) and Type-2 DM (36%),In which Subclinical hypothyroidism (13.33%) is more prevalent than Clinical Hypothyroidism (6.67%) though it was statistically not significant.

In GDM subjects 11% had thyroid dysfuntion but due to very small sample size of GDM subjects, this distribution was statistically not significant.

Table12: Distribution of total cholesterol according to thyroid status among diabetic subjects in the study group (n=120)

THYROID STATUS	TOTAL CHOLESTEROL (mg/dl)				Total
	Normal (< 200mg/dl)		Elevated (>200)		
	No.	%	No.	%	
Normal (0.4-4.0 IU/ml)	60	74.07%	21	25.93%	81
Subclinical Hypothyroidism (> 4-10IU/ml)	12	52.74%	11	47.82%	23
Hypothyroidism (>>10 IU/ml)	4	36.37%	7	63.63%	11

Hyperthyroidism (<0.4IU/ml)	4	80%	1	20%	5
	80	100%	40	100%	120

P-value = 0.0277

Among the study subjects who had diabetes, the subjects with subclinical Hypothyroidism and clinical Hypothyroidism had higher proportion of elevated total cholesterol (47.82% and 63.63% vs. and 25.93%) in comparison to euthyroid subjects and this difference was statistically significant (p-value < 0.05).

Table 13: Distribution of Triglyceride according to thyroid status among diabetic subjects in the study group (n=120)

THYROID STATUS	TRIGLYCERIDES (mg/dl)				Total
	Normal (< 150mg/dl)		Elevated (>150mg/dl)		
	No.	%	No.	%	
Normal (0.4-4.0 IU/ml)	55	67.90%	26	32.10%	81
Subclinical Hypothyroidism (> 4-10IU/ml)	13	56.52%	10	43.48%	23
Hypothyroidism (>>10 IU/ml)	2	18.18%	9	81.82%	11
Hyperthyroidism (<0.4IU/ml)	3	60%	2	20%	5
Total	73	100%	47	100%	120

P-value = 0.0164

Among the study subjects who had diabetes, the subjects with subclinical Hypothyroidism and clinical Hypothyroidism had higher proportion of elevated triglyceride level (43.48% and 81.82% vs. 32%) in comparison to euthyroid subjects and this difference was statically significant (p-value = < 0.05).

Table 14: Distribution of HDL Cholesterol according to thyroid status among diabetic subjects in the study group (n=120).

Thyroid Status	HDL Cholesterol (mg/dl)				Total
	Normal (> 40mg/dl)		Reduced (< 40 mg/dl)		
	No.	%	No.	%	
Normal (0.4-4.0 IU/ml)	43	53.09%	38	46.91%	81
Subclinical Hypothyroidism (> 4-10IU/ml)	6	26.08%	17	73.91%	23
Hypothyroidism (>10 IU/ml)	3	27.27%	8	72.73%	11
Hyperthyroidism (<0.4IU/ml)	1	20%	4	80%	5
Total	53	100%	67	100%	120

P-value : 0.0436

Among study subjects, who had diabetes, the subjects with subclinical Hypothyroidism and clinical Hypothyroidism had higher proportion of reduced HDL cholesterol level (73.91% and 72.73% vs. 46.91%) in comparison to euthyroid and this difference was statistically significant (p-value < 0.05).

Table 15: Distribution of LDL Cholesterol according to thyroid status among diabetic subjects in the study group (n=120).

THYROID STATUS	LDL Cholesterol (mg/dl)				Total
	Normal (< 130mg/dl)		Elevated (>130mg/dl)		
	No.	%	No.	%	
Normal (0.4-4.0 IU/ml)	69	85.19%	12	14.81%	81
Subclinical Hypothyroidism (> 4-10IU/ml)	17	73.91%	6	26.08%	23
Hypothyroidism (>10 IU/ml)	5	45.45%	6	54.55%	11
Hyperthyroidism (<0.4IU/ml)	4	80%	1	20%	5
Total	95	100%	25	100%	120

P-value = 0.0208

Among study subjects who had diabetes, the subjects with subclinical Hypothyroid and clinical Hypothyroid had higher proportion of elevated LDL cholesterol (26.08% and 54.55% vs. 14.81%) in comparison to euthyroid subjects and this difference was statistically significant (p-value < 0.05).

DISCUSSION

This study sought to find out the prevalence of thyroid dysfunction in people with all type of diabetes mellitus (Type-1 DM, Type -2 DM, LBW Type -2 DM and GDM) in our region.

There is a complex interaction between DM and thyroid disorder. Because of insulin and thyroid hormones are closely involved in cellular metabolism, any abnormal levels of one of them may result in the functional derangement of other.

A total 170 subjects were taken, which were divided in to study group (120) and control group (50). In which study group subjects was diabetic while control group subjects taken as a normal (non-diabetic subject). Studied over 1.5 years March 2018 to Oct 2019)

The subject were in age group of 13 yrs to 80 yrs, in which about 50% of the study population were in age group 41-60 yrs while 25% were in age group in 61-80 yrs. Majority of study subjects were Male 65 (54.16%) while 55 (45.84%) were females. Out of 120 subjects of study group, majority of patients were found of DM Type-II i.e. 50 followed by Type-I DM and LBW Type-II DM i.e. 30, and 10 patients were found of GDM. Among study subjects 15% were overweight (BMI 23-24.9) and 20 % were obese (BMI > 25).

In our study, we demonstrated a 32.5% prevalence of thyroid disease among 120 DM subjects compared to 16% in control group. Among this, 19.17% had subclinical hypothyroidism. It is similar to many studies like Palma et al[8] (thyroid dysfunction 14.7%), Celani et al[9], and Udiong et al[10]. study has shown a high incidence (46.5%) of abnormal thyroid hormone levels among the diabetics in Nigeria (hypothyroidism 26.6%, hyperthyroidism, 19.9%).

Next to subclinical hypothyroidism, the clinical hypothyroidism was common (9.17%) followed by hyperthyroidism (4.17%). So total hypothyroidism is more common (28.34%) than hyperthyroidism (4.17%). This also supported by various study like Moghetti et al[11] (89% hypothyroidism and 11% hyperthyroidism); Ajaz Ahmad Telwani et.al[12] (29% thyroid dysfunction); Sudeb Mukherjee

et. Al[13] (43.33% SCH and 9.2% hypothyroidism); Navneet Agrawal et. Al[14] (15.2% SCH, 10.6% hypothyroids) Ashok Khurana et.al[15], and Sultan S. Alotaibi et.al[16] (25% SCH and 3.5 hypothyroidism) etc.

The study population was predominantly male, but the prevalence of hypothyroidism was higher in female 32.72% in comparison to males 24.61%. This is comparable to studies of Papazafiropoulou et al. (Female 31.4% and male 13.4%), Celani et al[9], M.V.Jali et.al[17] (Female 25% and Male 10%), as well as Michalek et al[18], in which they also reported prevalence of thyroid disorders higher in diabetic females as compared to diabetic males, who found female predominance of 60%.This could be partly explained by the fact that autoimmune diseases tend to occur predominantly in females.

In our study subclinical hypothyroid, clinical hypothyroid and hyperthyroid had more prevalent in >30 yrs of age and prevalence is increases as age is advanced similar to Tahziba Hussain et.al[19] and M.V.Jali et.al[17] study (p-value < 0.05%).

Our study also showed that as the duration of DM increase, the prevalence of thyroid dysfuntion increases similar as Stanley U. Ogbonna et.al[20] and M.V.Jali et.al[17] (p-value <0.05).
Our study also showed that trend of thyroid dysfuntion was similar in different types of DM (subclinical hypothyroid> clinical hypothyroid > hyperthyroid) but frequency of dysfuntions differs in amongst like Type-1 DM , Type-2 DM and LBW Type-2 DM showed 43.33%,36%, and 23.33% of thyroid dysfuntions respectively.

Subjects with Type-1 DM showed 23.33% subclinical hypothyroidism, 13.33% clinical hypothyroidism and 6.67% hyperthyroidism similar to Guillermo E. Umpierrez et.al[21] study. Subjects with Type-2 DM showed 24% subclinical hypothyroidism, 8% clinical hypothyroidism and 4% hyperthyroidism and subjects with LBW Type-2 DM showed 13.33% subclinical hypothyroidism, 6.67% clinic hypothyroidism and 3.33% hyperthyroidism. In GDM subject 11% had thyroid dysfunction but due to small sample size, this distribution was statistically not significant.

The reasons for both high and low level of thyroid hormones in diabetes are the modified TRH synthesis and release, de Greef WJ et. Al[22] This also due to various medications used for DM. Many studies like Engin Güney et.al concluded that the treatment of DM by sulfonylurea leads to an increase in occurrence of goitre and hypothyroidism.

Subclinical hypothyroidism is defined as an above normal level of serum TSH with normal free thyroxine level. SCH can causes left ventricular diastolic dysfunction, lack of ovulation, increased expression of LDL receptors, and decreased HDL receptors. It is a threat indicator used for cardiovascular disease especially for atherosclerosis and coronary heart disease.SCH also independently increase the risk of insulin resistance mainly in muscles and adipose tissue.
So normalization of TSH level will decrease the post prandial blood glucose, HbA1c and lipids level (similar to Edina Billic – Komarice et al[23]). Timely diagnosis of SCH in DM patients and adequate treatment is very important to prevent complications.

ANOVA test was done to test the difference in mean HbA1c levels between four groups (Normal, SCH, Clinical hypothyroidism and hyperthyroidism) and to test the difference in mean BMI level between four groups, and ANOVA test shows that there was no statistically significant difference in mean HbA1c between four groups (p> 0.05) and mean BMI between four groups (p> 0.05).

Our study showed that the study subjects who had diabetes, the subject with subclinical hypothyroidism (73.91%) and clinical hypothyroidism (81.81%) had positive Anti TPO antibody. Therefore this study finding validates that the elevated anti-TPO levels could be correlated with autoimmune thyroid dysfunction. According to Jayashankar C.A. et al[24], the prevalence of Anti-TPO Ab in patients with clinical and subclinical hypothyroidism was 80% and 50% respectively. Similarly, Mohanty et al[25] have showed that 45 of the 61 subclinical hypothyroid patients had elevated anti-TPO (73.78%), thereby suggesting an autoimmune aetiology for subclinical thyroid dysfunction and a higher risk of developing overt hypothyroidism in such patients.

Our study showed that the study subjects who had diabetes, the subjects with subclinical Hypothyroidism and clinical Hypothyroidism had higher proportion of elevated total cholesterol (47.82% and 63.63% vs. and 25.93%) in comparison to euthyroid subjects and this difference was statistically significant (p-value < 0.05).

In our study, subjects who had diabetes, the subjects with subclinical Hypothyroidism and clinical Hypothyroidism had higher proportion of elevated triglyceride level (43.48% and 81.82% vs. 32%) in comparison to euthyroid subjects and this difference was statically significant (p-value = < 0.05).

And also the subjects with subclinical Hypothyroidism and clinical Hypothyroidism had higher proportion of reduced HDL cholesterol level (73.91% and 72.73% vs. 46.91%) in comparison to euthyroid and this difference was statistically significant (p-value < 0.05).

And also subjects who had diabetes, the subjects with subclinical Hypothyroid and clinical Hypothyroid had higher proportion of elevated LDL cholesterol (26.08% and 54.55% vs. 14.81%) in comparison to euthyroid subjects and this difference was statistically significant (p-value < 0.05).

CONCLUSIONS

Our study have proved that increased prevalence of hypothyroidism especially subclinical hypothyroidism in all type of DM patients which is consistent with many previous studies, hence it may be advisable to check thyroid status in every DM patients for the better management of DM and to reduce its complications.

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