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INCIDENCE OF HYPOTHYROIDISM IN DIABETES MELLITUS AND CORRELATION OF HBA1C LEVELS WITH TSH LEVELS

General Medicine

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ABSTRACT

Background: Two of the most common endocrinological diseases are Diabetes and Hypothyroidism. There is a definite link between hyperinsulinemia, resistance to insulin and hypothyroidism. There are numerous mechanisms through which hypothyroidism and insulin resistance causes derangement of glycemic control. **Aim:** To study the incidence of hypothyroidism in diabetes mellitus patients and to correlate HbA1c levels with TSH levels. **Materials and Methods:** This study done in 385 diabetic patients admitted in general wards and OPD between October 2020 to August 2022 in the department of General Medicine. **Results:** In present study majority of cases shows fasting blood sugar level 101-110 mg/ mg/dl 27 followed by 14 cases shows in ≤ 100 mg/dl and 7 cases found >110 mg/ mg/dl. Most of cases shows post prandial blood sugar level 151 to 200 mg/dl 19 cases followed by 17 cases found in ≤ 150 mg/dl and 12 cases in > 200 mg/mg. The Relation between HbA1C and TSH There is statistically not significant association. **Conclusions:** Determination of TSH is accurate, accessible, safe and inexpensive test to diagnose subclinical hypothyroidism. Subclinical hypothyroidism is quite hard to diagnose. In practice this is often overlooked. Adequate diagnosis requires conducting extensive laboratory tests other than routine as the TSH test. There is statistically significant association between hypothyroidism with gender. There is statistically significant association between age and hypothyroidism. Relation between HbA1C and TSH There is statistically not significant association.

KEYWORDS

Diabetes Mellitus, HbA1C and TSH(Thyroid stimulating Hormone).

INTRODUCTION

Diabetes mellitus is a disorder of glucose metabolism wherein the digested carbohydrates are not metabolised either due to an absolute or relative lack of the hormone insulin, that is derived from the pancreas, or due to a relative peripheral resistance for glucose uptake in tissues like the liver, adipose tissue, and skeletal muscle[1].Hypothyroidism refers to an absolute or a relative deficiency in the thyroid hormones. Diabetes mellitus is diagnosed using either Random, fasting, or post prandial plasma glucose levels, or with Glycated haemoglobin (HbA1c) levels in a patient. Hypothyroidism may or may not present with signs and symptoms pertaining to the disease[2]. Hypothyroidism can be primary, wherein the defect is in the thyroid gland per se, or secondary, wherein the thyroid gland fails to function due to lack of, or an abnormal, stimulation by the pituitary hormone thyrotropin (TSH)[3]. Since majority of the thyroid hormone triiodothyronine (T3) is formed from peripheral conversion of the thyroid hormone thyroxin (T4) in the tissues, its level in plasma is minimal, and measurement of serum T3 in plasma proves to be a difficult task.[4]. Hence, thyroid gland dysfunction is diagnosed mainly using two parameters – Serum free T4 and serum Thyrotropin (Thyroid Stimulating Hormone; TSH) levels. Subclinical Hypothyroidism is diagnosed in the presence of an elevated serum TSH with a normal Serum free T4 whereas overt Hypothyroidism is diagnosed when there is an elevated serum TSH with decreased free T4[5].Subclinical Hypothyroidism may be found in 6-8% women and 3% men[6]. There is a significantly higher proportion of individuals who suffer from thyroid dysfunction in the diabetic population when compared to the general population, the most frequent pattern being subclinical.These thyroid disorders are more prevalent in women than in men.[6].There is a definite link between hyperinsulinemia, resistance to insulin and hypothyroidism. There are numerous mechanisms through which hypothyroidism and insulin resistance causes derangement of glycemic control. Thus the significance of treating hypothyroid patients with L thyroxin for better glycaemic control is well indicated. Some studies have also shown positive effect of metformin therapy in control of thyroid hormone levels.[7].

AIM

To study the incidence of hypothyroidism in diabetes mellitus patients and to correlate HbA1c levels with TSH levels.

OBJECTIVES

Primary Objective: - To Study the incidence of Hypothyroidism in Diabetes patients.
Secondary Objective:- To study the correlation of HbA1c levels with TSH level and other risk factors associated with diabetes and hypothyroidism.

Study Design: A prospective observation study.
Study Setting: The study material comprised 384 patients admitted to Government Hospital, Kadapa
Study Subjects: Patients admitted to General Medicine Department, Government General Hospital, Kadapa
Sample Size: 384
Study period: October 2020 to August 2022

Inclusion Criteria:
- Type 2 Diabetes Mellitus patients of more than 2 years duration with or without Hypothyroidism.
- Any patient on treatment for Hypothyroidism with history of type 2 Diabetes Mellitus.

Exclusion Criteria:
- Patients in Hyperglycemic emergencies.
- Patients with previous history of Thyroid surgery.

Criteria for diagnosis:
- Clinical examination, Routine blood investigations
- HbA1c, FBS, PPBS
- Thyroid Profile

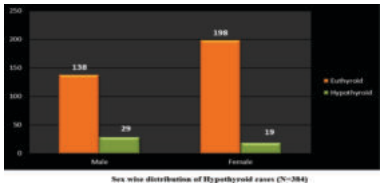
The Results were analyzed with reference to age, sex and risk factors, and clinical examination.

Ethical Clearance: Before collection of data, all subjects were briefed about the purpose of the study and written informed consent was obtained. Ethical clearance was obtained from the institutional ethics committee.

Statistical Analysis: All the data was initially entered into Microsoft Excel , and later these spreadsheets were used for analysis. Statistical analysis was done by using S.P.S.S. version 20.0.

Descriptive statistics were calculated as frequency, percentage, mean and standard deviation. Descriptive data were represented using various tables, graphs, diagrams.

RESULTS



Sex wise distribution of Hypothyroid cases (N=384)

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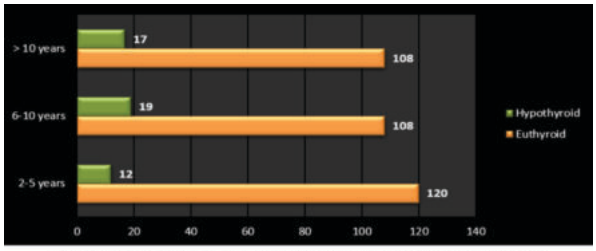
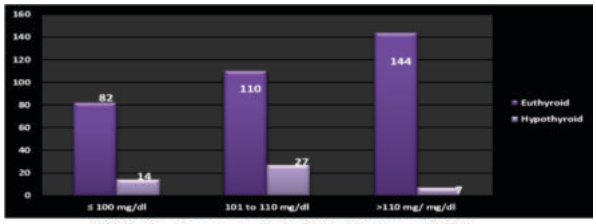
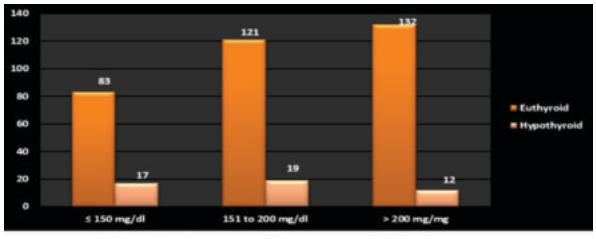


Distribution of Hypothyroid cases according to Diabetes Mellitus duration (N=384)
The above figure shows majority of cases found in 6-10 years DM duration group e.g. 19 followed by 17 in > 10 years, 12 cases in 2-5 years duration group.



Distribution of cases according to fasting blood sugar (N=384)

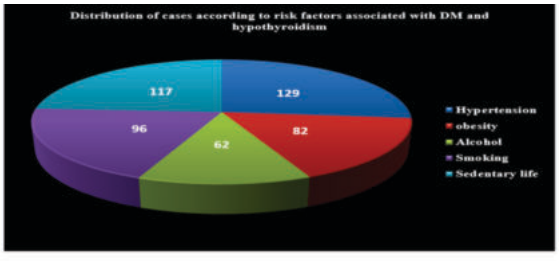


Distribution of cases according to post prandial blood sugar

Relation between HbA1C and TSH

TSH (microIU/mL)	TSH 0.3-5.5	TSH 5.5-6.5	TSH >6.5	Total
HbA1C < 7%	72	4	4	80
HbA1C 7 – 8%	86	3	3	92
HbA1C 8 – 9%	92	7	5	104
HbA1C 9 – 10%	85	10	3	98
HbA1C > 10%	49	6	3	58
Total	336	30	18	100

The Chi-square statistic is 4.7118. The p-value is .787883. The result is not significant at p<.05.



The above figure shows majority of cases had a history of HTN 129 followed by sedentary life 117, smoking reported in 96 cases, obesity found among 82 cases and alcohol history reported by 62 cases.

DISCUSSION :

In current study majority of cases were found in above 60 years group 130 (34%) followed by 46-60 years group 126 cases , 120 and 108 cases were found in 31-45 and 18-30 years age group respectively. similar result found in the study of Coiro V et al [8] He reported that the majority of the members included in the study fell into the age groups 46 to 55 years (84 out of 200, 42 percent), followed by 56 to 65 years (50 out of 200, 25 percent). Another study conducted by Gencer B et al [9] he reported similar result to our study.

In present study majority of study participants were female contributing 217 (56.51) and males 167 (43.48%).similar result found in the study by Gray RS et al [10] he reported majority participants was male.

In this study majority of cases were found in 46-60 years age group e.g. 18 followed by >60 years age group 12, 11 cases found in 18-30 years age group and 7 cases found in 31-45 years age group.Incidence of hypothyroidism among type 2 DM was 12.5%. This study had a higher rate of Hypothyroidism compared to few other studies. In the study in Segovia, Spain, it was 10.7% [12] and in the Fremantle Diabetes Trial, it was 8.8%.

In current study Sex wise distribution of Hypothyroid cases (N=100) Sex wise distribution of Hypothyroid cases (N=384) majority of cases found in male e.g. 29 and 19 cases in female. Most of the trials conducted for similar aims have noticed an almost similar pattern of distribution of patients.

The Fremantle Diabetes Study was done exclusively in females and had a lower prevalence of HT of about 8.7% compared to 13.9 percent in our study [10]. Chen HS et al revealed in a study in Taiwan that HT was 5.3% in males and 8.4% in females with type 2 DM [11]. In the Greek study, the prevalence was much higher at 18.5% in females, and 5.5 percent in males, the male prevalence being almost comparable to other studies[8]

In current study majority of cases found in 6-10 years DM duration group e.g. 19 followed by 17 in > 10 years, 12 cases in 2-5 years duration group.Similar result reported by Chen HS et al [11]

In present study majority of cases shows fasting blood sugar level 101-110 mg/ mg/dl 27 followed by 14 cases shows in ≤ 100 mg/dl and 7 cases found >110 mg/ mg/dl.Similar result reported by Chen HS et al [11]

In this study majority of cases shows post prandial blood sugar level 151 to 200 mg/dl 19 cases followed by 17 cases found in ≤ 150 mg/dl and 12 cases in > 200 mg/mg.Similar result found in the study conducted by Chen HS et al [11]

In current study Relation between HbA1C and TSH There is statistically not significant association. Gencer B et al [9] he reported similar result to our study

In current study majority of cases had a history of HTN 129 followed by sedentary life 117, smoking reported in 96 cases, obesity found among 82 cases and alcohol history reported by 62 cases. Gencer B et al [9] he reported similar result to our study

In this study there There is statistically significant association between age and hypothyroidism. There is statistically significant association between hypothyroidism with gender. Similar result found in the study of Yang et al [13] he reported that the incidence of HT in patients with type 2 DM is clearly more prominent in females, and this observation has been statistically significant in the study.

CONCLUSION

Diabetes Mellitus and hypothyroidism are very closely related to each other and both are associated with several metabolic abnormalities.The normalization of TSH levels leads to a reduction in postprandial glucose levels, CRP, HbA1c and lipids. This indicates a significant effect of treatment with L-thyroxine on glycemic control in patients with subclinical hypothyroidism.

Subclinical hypothyroidism is quite hard to diagnose. In practice this is often overlooked. Adequate diagnosis requires conducting extensive laboratory tests other than routine as the TSH test.

There is statistically significant association between hypothyroidism with gender. There is statistically significant association between age and hypothyroidism. Relation between HbA1C and TSH There is statistically not significant association.

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