



EVALUATION OF ASSOCIATION BETWEEN AGE, GENDER, DURATION OF DIABETES MELLITUS AND HbA_{1c} WITH THYROID PROFILE IN DIABETES MELLITUS PATIENTS

Bhaskar MK¹, Sanjay Zachariah², Annette Menezes³

¹Associate Professor, Department of General Medicine, SUT Academy of Medical Sciences, Vattapara, Vencode, Trivandrum, Kerala.

²Associate Professor, Department of General Medicine, Sree Gokulam Medical College and Research Foundation, Venjaramoodu, Trivandrum, Kerala.

³Medical Officer, ECHS Polyclinic, Thuruvickal Post, Trivandrum, Kerala.

Conflicts of Interest: Nil

Corresponding author: Dr Sanjay Zachariah

DOI: <https://doi.org/10.32553/ijmsdr.v4i11.701>

Abstract:

Background: Diabetes mellitus can be observed in any age group and gender. If it is not treated on time, it can lead to development of other disorders. The present study aims to evaluate the association of age, gender, duration of diabetes and HbA_{1c} with thyroid profile in patients with diabetes mellitus.

Materials and Methods: The study included 100 diabetic patients based on the inclusion and exclusion criteria. The study protocol was explained to each patient and informed consent was obtained. All the patients demographic and clinical data was recorded and analysed. SPSS (16.0) version used for analysis.

Results: Patients between 41-50 years of age showed more of hypothyroid profile. Males are less prone to thyroid disorders compared to females. Patients with DM less than 10 years showed hypothyroid profile. Maximum hypothyroid patients showed HbA_{1c} level less than 7%.

Conclusion: The study results conclude that as age progresses, females are more prone to thyroid disorders compared to males.

Keywords: Age, Diabetes Mellitus, Thyroid, Gender, HbA_{1c}, Euthyroid

Introduction:

The WHO estimated that by 2030 the prevalence of diabetes mellitus (DM) will be 4.4%. The total number of people with DM is projected to rise up to 425 million in 2030. DM is one of the common endocrine disorders which affect the various systems in the body. Based on the insulin secretion it is classified as type 1 (Insulin Dependent Diabetes Mellitus) and type 2 (Non Insulin Dependent Diabetes Mellitus)^{1,2}. Type 1 is treated with insulin and type 2 with oral hypoglycemic drugs. It was observed that some type 2 DM also required insulin. DM can develop at any age and affect both genders. But it was most commonly observed in males aged above 40 years. Tight glycemic control will prevent the disease

progression and development of other complications³. HbA_{1c} is the most common parameter used to detect the glycemic control. Studies showed that DM will affect the other endocrine glands and alters their hormone secretions. Among them is thyroid gland. It was observed that thyroid disorder is most common in DM^{4,5}. It was observed that 17.5% DM patients are associated with thyroid dysfunction. Thyroid hormones affect glucose metabolism directly and indirectly. They either increase the synthesis or decrease the utilization of glucose by body.

Both effects lead to increased glucose levels⁶. It was observed that DM and thyroid disorders have some association. The changes in DM with thyroid dysfunction are related to various factors⁷. The present study aimed to evaluate the association between the age, gender, duration of DM and HbA_{1c} with thyroid profile in diabetes mellitus patients.

Materials and Methods

Study design and settings

This study was done in Department of General Medicine, Command Hospital Air force, Bangalore, Karnataka. It is a cross sectional study and approved by Institutional Human Ethics Committee (IHEC).

Inclusion criteria

- Both gender
- Diabetes mellitus not more than 25 years
- Not on radiation therapy

Exclusion criteria

- No recent thyroid surgery
- No thyroid cancer
- Not on steroid therapy
- Pregnancy

Procedure

The study was done prospectively. A Total of 100 patients fulfilled the inclusion and exclusion criteria. All the patients were explained the study procedure and informed consent was obtained. Demographic data (age, gender), clinical data (Duration of diabetes) and biochemical data (glucose, HbA_{1C}, thyroid profile) was recorded. Fully automated analyzer and ELISA used for the estimation of biochemical parameters^{8,9}.

Statistical analysis

The data was expressed in number and percentage. Statistical Package for Social Sciences (16.0) version used for analysis. Pearson correlation was used to find the association between the demographic, clinical and biochemical parameters at 95% confidence interval.

Results

Total 100 patients were screened in this study. DM patients with age between 41-50 years showed high association with thyroid dysfunction. This age group had 2.02 times higher chances to develop the thyroid disorders (Table-1). In euthyroid 48 were females and 33 were males. 12 patients showed hypothyroid profile. Female patients are almost 1.92 times more likely to get thyroid problems than males (Table-2). Duration of DM showed significant association with thyroid profile. 11 patients showed hypothyroid profile and 1 had hyperthyroid profile (Table-3) in DM patients. Significant association was observed between HbA_{1C} and thyroid dysfunction. 13 patients with hypothyroid profile showed less than 7 %

HbA_{1C} levels (Table-4).

Discussion

Metabolic disorders can affect the various systems in the body that can lead to mortality and morbidity. DM is the common metabolic disorder related to glucose metabolism. Decreased insulin secretion or sensitivity of body cells leads to hyperglycemia. The increased glucose levels affect the protein and fatty acid metabolism. The studies showed that DM affects the thyroid function in two major ways. First at the level of CNS, control the release of thyroid stimulating hormone (TSH) release and secondly conversion of T₄ to T₃ at cellular levels. Previous studies showed that hyperglycemia affects the hepatic and serum thyroid levels. This relationship can alter based on the age, gender and duration of diabetes. Mirella H et.al., concluded that patients aged between 40-50 years with DM showed significant changes in thyroid profile compared to other age groups. It was observed that hypothyroidism is more common than hyperthyroidism in above age group patients¹⁰. The present study also showed similar results. Jieun J et.al., study observed that females are more prone to thyroid disorder compared to males. Duration of DM, increases changes in the thyroid profile¹¹. In our study females with duration of DM less than 10 years showed significant changes in thyroid profile compared to males. HbA_{1C} is one of the parameters considered to know the glycemic control of the DM patients. The changes in HbA_{1C} levels indicate the progression of DM. In this study HbA_{1C} levels more than 7% showed significant decrease in thyroid levels compared to others. Zhaowei M et.al., study also showed the similar changes in their study. Patients with high HbA_{1C} levels showed significant changes in the thyroid profile mainly in hypothyroid. The study results explains that age, gender, duration of DM and HbA_{1C} levels play a major role in the treatment of patients with DM associated with thyroid disorders.

Table 1: Association of age with thyroid dysfunction in diabetes mellitus patients

Age (Years)	n	Thyroid profile					
		Euthyroid		Hyperthyroidism		Hypothyroidism	
		n	%	N	%	n	%
31-40	19	16	84.20	0	0.00	3	15.80
41-50	41	30	73.20	1	2.40	10	24.40
51-60	25	20	80.00	2	8.00	3	12.00
61-70	15	15	100.00	0	0.00	0	0.00
Total	100	81	81.00	3	3.00	16	16.00

Table 2: Association of gender with thyroid dysfunction in diabetes mellitus patients

Gender	n	Thyroid profile					
		Euthyroid		Hyperthyroidism		Hypothyroidism	
		n	%	N	%	n	%
Male	38	33	86.80	1	2.60	4	10.50
Female	62	48	77.40	2	3.20	12	19.40
Total	100	81	81.00	3	3.00	16	16.00

Table 3: Association of duration of diabetes mellitus with thyroid dysfunction in diabetes mellitus patients

Duration of diabetes mellitus (Years)	n	Thyroid profile					
		Euthyroid		Hyperthyroidism		Hypothyroidism	
		n	%	N	%	n	%
<10	57	45	78.90	1	1.80	11	19.30
>10	43	36	83.70	2	4.70	5	11.60
Total	100	81	81.00	3	3.00	16	16.00

Table 4: Association of HbA_{1C} levels with thyroid dysfunction in diabetes mellitus patients

HbA _{1C} (%)	n	Thyroid profile					
		Euthyroid		Hyperthyroidism		Hypothyroidism	
		n	%	N	%	n	%
<7	76	61	80.30	2	2.60	13	17.10
>7	24	20	83.30	1	4.20	3	12.50
Total	100	81	81.00	3	3.00	16	16.00

Conclusion

The study results concluded that there is a significant association between the age, gender, duration of diabetes and HbA_{1C} levels with thyroid profile. Management of glucose along with thyroid hormones levels in normal range can reduce the morbidity and mortality in diabetes mellitus with thyroid disorders.

References

1. Chubb SA, Davis WA, Inman Z, Davis TM. Prevalence and progression of subclinical hypothyroidism in women with type 2 diabetes: the Fremantle Diabetes Study. *Clin Endocrinol (Oxf)*, 2005; 62(4): 480-486.
2. J.D. Baxter, P. Webb. Thyroid hormone mimetics: potential applications in atherosclerosis, obesity, and type 2 diabetes. *Nature Reviews Drug Discovery*, 2009; 8(4): 308-320.
3. Chubba SA, Davis WA, Inman Z, Davis TM. Prevalence and progression of subclinical hypothyroidism in women with type 2 diabetes: the Fremantle Diabetes Study. *Clin Endocrinol (Oxf)*, 2005; 62 (4): 480-86.
4. G. Mory, D. Ricquier, P. Pesquies, P. Hemon. Effects of hypothyroidism on the brown adipose tissue of adult rats: comparison with the effects of adaptation to cold. *Journal of Endocrinology*, 1981; 91(3): 515-524.
5. Elder J, McLelland A, O'Reilly DS, Packard CJ, Series JJ, Shepherd J. The relationship between serum cholesterol and serum thyrotropin, thyroxine, and triiodothyronine concentrations suspected hypothyroidism. *Ann Clin Biochem.*, 1990; 27(Pt2): 110-113.
6. Islam S, Yasmine S, Khan AS, Alam NH. A comparative study of thyroid hormone levels in diabetic and nondiabetic patients. *South East Asian J Trop Med Public Health*, 2008; 39(5): 913-16.
7. Gray RS, Smith AF, Clarke BF. Hypercholesterolemia in diabetics with clinically unrecognized primary thyroid failure. *Horm Metab Res.*, 1981; 13(9): 508-510.
8. Happy C, Himashree B, Alice AR, Kaustubh B. Evaluation of thyroid function in type 2 diabetes in north eastern patients in Indi: 2018;7(4):752-5.
9. Rizos CV, Elisaf MS, Liberopoulos EN. Effects of thyroid dysfunction on lipid profile. *Open Cardiovasc Med J* 2011;5:76-84.
10. Mirella H, Mira SZ, Sami TA. Thyroid disorders and diabetes mellitus. *Journal of Thyroid Research* 2011:1-7
11. Jieun J, Youngsook K, Jaeyong S, Sand AL, Young C, Eun CP. Association between thyroid hormones and the components of metabolic syndrome. *BMC Endocrine Disorders* 2018;29:1-11.
12. Zhaowei M, Ming L, Qing Z, Kun S, Jain T, Qiang j et.al., Gender and age impacts on the association between thyroid function and metabolic syndrome in chinese. *Medicine* 2015;94(50):1-9.