

Comparative Study of Thyroid Profile in Geriatric and Non-Geriatric Type-2 Diabetics

Pankaj Kumar Jha¹, Gunjan Kumar Mandal²

ABSTRACT

Introduction: In clinical practice, diabetes mellitus (DM) and thyroid diseases are very common endocrine disorders. These are commonly affected by each other and association between both conditions have long been reported.

Material and Methods: The study includes 160 patients, 80 patients in Geriatric age groups (≥ 60 years) and 80 patients in Non-Geriatric age groups (< 60 years) with type 2 diabetes mellitus visiting the Medicine out patients department. Thyroid profile were assayed in type 2 diabetic patients.

Results: It was noted that thyroid dysfunction was prevalent in 88 (55%) patients out of the 160 included in our study of which 42 (47.72%) were in the non-geriatric age group and the remaining 46 (52.27%) were in the geriatric age group.

Conclusion: The study has determined that screening should be recommended for all geriatric age group patients to rule out thyroid dysfunction.

Keywords: Thyroid profile, Geriatric patients, Non-Geriatric patients, Diabetes mellitus.

INTRODUCTION

Diabetes mellitus is a group of disorders in which glucose concentration in blood increases. Different types of DM are caused by interaction of environmental and genetic factors.

On the basis of etiology, factors causing hyperglycemia in DM are decrease in insulin secretion, reduction in glucose utilization and due to increase in glucose production. The DM causes secondary changes in multiple organ system. It is most common cause of ESRD (End stage renal disease) and adult blindness in USA.

It is one of the most important predisposing factor for cardiovascular diseases. So, in near future DM will be leading cause of morbidity and mortality world wide.¹ After DM, thyroid disease are most common endocrine disorder in world.² In North India, thyrotoxicosis is highly prevalent.³ The prevalence and pattern of thyroid disorders depends upon many factors viz., geographical factors, environmental conditions, socioeconomic status, nutritional status and smoking habits. Smoke interferes with the thyroid gland hormonogenesis and with peripheral thyroid hormone action.⁴

Subclinical hyperthyroidism is a clinical syndrome in which there are no signs or symptoms of thyrotoxicosis but the serum TSH levels is subnormal despite normal serum FT3 and FT4 concentrations. Its diagnosis is mainly laboratory based.⁵

The most common endocrine disorders encountered in clinical practice are DM and thyroid diseases. Diabetes and thyroid disorders have been shown to mutually influence each other and association between both conditions have long been reported.^{6,7} DM affects thyroid function tests and thyroid hormones affects the regulation of carbohydrate metabolism and pancreatic

function.⁸

Thyroid function are influenced by DM in two sites, primarily at the level of hypothalamic control of TSH release and secondly in the peripheral tissue where conversion of T_4 to T_3 occurs. Increased in blood sugar causes reversible decrease in activity and hepatic concentration of T4-5-deiodinase, decrease in serum concentration of T_3 , increased levels of reverse T_3 and low, normal or increased level of T_4 .⁹

If DM is not controlled properly, it may cause a "low T3 state" in which total and free T3 concentration in serum decreases, reverse T3 increases but serum T4 and TSH concentration remains nearly normal.

Decrease in serum T3 level is due to reduced conversion of T4 to T3 in peripheral circulation. Several studies shows that determination of plasma T3 concentration is dependent on long term diabetic control. If DM is not controlled properly, it may cause abnormal TSH response to TRH or absence of normal nocturnal peak of TSH.¹⁰

According to the WHO and UN, 2001, people aged 45-59 years are considered 'middle aged' and those above 60 years are considered to be Geriatrics, though there is no fixed or mandatory criteria or guideline. In the real world especially where jobs and pension schemes and other such scenarios where benefits are concerned, people over 65 years are considered to be geriatric.¹¹ In this study though, people ≥ 60 years will be considered as geriatric.

The aim of our study was to assess the correlation and association of DM and thyroid disease in geriatric and non-geriatric patients and to make the probable outcome in both groups.

MATERIAL AND METHODS

This study was done in biochemistry department in collaboration with General Medicine department, at Prasad institute of medical sciences and includes 80 patients each (Total 160 patients) in the Geriatric and Non-Geriatric age groups with Type 2 Diabetes Mellitus were randomly selected and detailed medical history were taken and general and systemic examination were done after taking consent from the patient after which they were subjected to Thyroid Function tests and other appropriate and related tests, the results of which were statistically analysed.

Inclusion Criteria

80 patients in the Geriatric age group (≥ 60 years) with type 2

¹Assistant Professor, ²Tutor, Prasad Institute of Medical Sciences, Banthara, Lucknow, UP -226401, India

Corresponding author: Dr. Pankaj Kumar Jha, Prasad Institute of Medical Sciences, Lucknow, India.

How to cite this article: Pankaj Kumar Jha, Gunjan Kumar Mandal. Comparative study of thyroid profile in geriatric and non-geriatric type-2 diabetics. International Journal of Contemporary Medical Research 2017;4(2):421-424.

diabetes mellitus.

80 patients in the Non-Geriatric age group (< 60 years) with type 2 diabetes mellitus.

Exclusion Criteria

1. Patients not willing to give consent for examination.
2. Type 1 Diabetic patient.
3. Patients who are below age 20.
4. Patients on Hormone Replacement Therapy
5. Patients of drug-induced hyperglycemia like steroid therapy etc.
6. Pregnant women
7. Patients on drugs known to cause Hypothyroidism (Propranolol, Iopanoic Acid, Iodide, Amiodarone, Salicylates, Phenytoin, Glucocorticoids, Lithium, Amphetamines, Sertraline, Aminogluthetimide, Dopamine, Somatostatin, Octreotide, Interleukins, Heroin)

8. Patients with cirrhosis of liver
9. Patients with Renovascular Hypertension or Renal failure

Sample collection: For estimation of blood glucose and thyroid profile, fasting blood sample were taken. Blood glucose was done by hexokinase method and thyroid profile by CMIA (chemiluminescent microparticle immunoassay) method.

STATISTICAL ANALYSIS

The data were analysed by SPSS 20 software. Data were expressed as mean and standard deviation for statistical analysis. Statistical significance was analysed by student's t-test. Significance was considered for all tests (p<0.05).

To find the significance of study parameters on categorical scale between two or more groups, Chi-square/ Fisher Exact test has been used. 95% Confidence Interval has been computed to find the significant features.

Age Group	Total No. of patients	Males	Females
Non-geriatric (20 – 59 yrs)	80	06 (7.5%)	74 (92.5%)
Geriatric (≥ 60 yrs)	80	03 (3.7%)	77 (96.2%)
Total	160	09 (5.6%)	151 (94.3%)

$\chi^2=1.06; P=0.303$

Table-1: Sex Distribution of the patients studied

Age Group	Normal (Euthyroid)	Hypothyroidism	Subclinical Hypothyroidism	Hyperthyroidism
Non-geriatric (n = 80)	38 (47.5%)	32 (40%)	07 (8.7%)	03 (3.7%)
Geriatric (n = 80)	34 (42.5%)	36 (45%)	09 (11.2%)	01 (1.2%)
Total (n = 160)	72 (45%)	68 (42.5%)	16 (10%)	04 (2.5%)

$\chi^2=1.71; P=0.635$

Table-2: Thyroid status of the patients studied

Non-geriatric age group	Normal	Hypothyroidism	Subclinical hypothyroidism	Hyperthyroidism
20-29 n=02	0	01(50%)	01(50%)	00
30-39 n=08	4(50%)	02(25%)	02(25%)	00
40-49 n=14	05(35.71%)	07(50%)	01(7.14%)	01(7.14%)
50-59 n=56	29 (51.78%)	22 (39.28%)	03 (5.35%)	02 (3.57%)
Total n=80	38 (47.5%)	32 (40%)	7(8.75%)	3 (3.75%)

The maximum number of non-geriatric patients with hypothyroidism were between 50-59 year of age – 22 (39.28%) out of 80 patients.

Table-3(i): Correlation of Thyroid status with age distribution; (A) Non-geriatric age group

Geriatric age group	Normal	Hypothyroidism	Subclinical hypothyroidism	Hyperthyroidism
60-64 n=39	16 (41.02%)	20(51.28%)	03 (7.69%)	00
65-69 n=34	17 (50%)	13 (38.23%)	03 (8.8%)	01(2.94%)
70-79 n=07	01 (14.28%)	03 (42.85%)	03 (42.85%)	0(%)
>80 n=0	0	0	0	0
Total n=80	34 (42.5%)	36 (45%)	09 (11.25%)	01 (1.25%)

In the geriatric age group the maximum number of patients with hypothyroidism were between 60-64 year of age – 20 (51.28%) out of 80 patients.

Table-3(ii): Correlation of Thyroid status with age distribution; (B) Geriatric age group

RESULTS

Total number of patients in our study were 160 out of which 80 were in Geriatric age group and 80 patients were in Non-geriatric age group. In Geriatric age group 03 (3.7%) patients were males and 77 (96.2%) were females. In Non-geriatric age group 06 (7.5%) were male and 74 (92.5%) were females (Figure-1 and table-1).

Our study shows that, in 80 geriatric patients 34 (42.5%) were euthyroid, 36 (45%) were hypothyroid, 09 (11.2%) were of subclinical hypothyroidism and 01 (1.2%) were hyperthyroid. Similarly, in 80 non-geriatric patients 38 (47.5%) were euthyroid, 32 (40%) were hypothyroid, 07 (8.7%) were of subclinical hypothyroidism and 03 (3.7%) were hyperthyroid. In total 160 patients 72 (45%) were euthyroid, 68 (42.5%) were hypothyroid, 16 (10%) were of subclinical hypothyroidism and 04 (2.5%) were hyperthyroid (Figure-2 and table-2).

Table 1 shows a high female Predominance with 74 (92.5%) and 77 (96.2%) patients in the non-geriatric and geriatric age groups respectively.

36 out of 80 patients (45%) in the geriatric group and 32 (40%) in the non-geriatric age group had hypothyroidism followed by subclinical hypothyroidism 9 (11.2%) and 7 (8.7%) in the two groups respectively.

DISCUSSION

In our study it was noted that thyroid dysfunction was prevalent in 88 (55%) patients out of the 160 included of which 42 (52.5%) were in the non-geriatric age group with 32 (40% of the 80 patients in that group) being hypothyroid, 7 (8.75%) having subclinical hypothyroidism and 3 (3.75%) having hyperthyroidism whereas the remaining 46 (57.5%) were in the geriatric age group with 36 (45%) being hypothyroid, 9 (11.25%) having subclinical hypothyroidism and 1 (1.25%) having a hyperthyroid state.

Thyroid dysfunction was predominantly seen in females (total of 151 patients with 74 in the non-geriatric and 77 in the geriatric age groups) with maximum number of patients, 129, being between 50 – 70 years.

In the study done by Patricia Wu diabetic patients have a higher prevalence of thyroid disorders compared with the normal population. Because patients with one Organ specific autoimmune disease are at risk of developing other autoimmune disorders, and thyroid disorders are more common in females.¹² A study conducted by Procesi et al showed that besides known factors such as age and drugs, thyroid function can be altered by Diabetes Mellitus and obesity.¹³

In their analysis of 70 patients, Cooppan and Kozak noted that 9 patients had masked hyperthyroidism with weight loss as the main indicator.¹⁴ Zondek H. et al detected an increased association of coronary heart disease in hypothyroidism.¹⁵ 2.3% of elderly women had hypothyroidism in Bahemuka and Hodgkinson study. Patients with clinically overt hypothyroidism is associated with hyperlipidemia in Kuttu. K.M, Bryant and Farid N.R study.¹⁶⁻¹⁸

The Colorado Thyroid Disease Prevalence Study conducted under Canaris G.J in the year 2000 showed that the consequences of untreated subclinical hypothyroidism include cardiac dysfunction or adverse cardiac endpoints (atherosclerotic disease and cardiovascular mortality), systemic hypothyroid

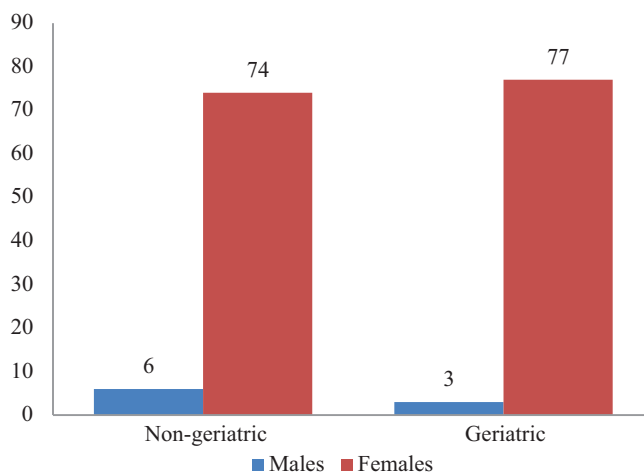


Figure-1: Sex Distribution of the patients studied

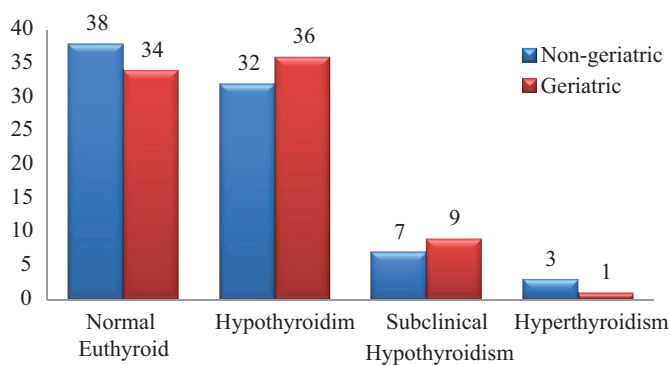


Figure-2 Thyroid status of the patients studied

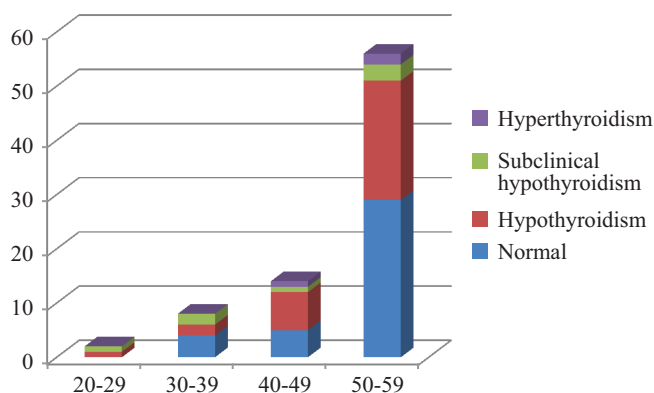


Figure-3: Correlation of Thyroid status with age distribution (Non-geriatric age group)

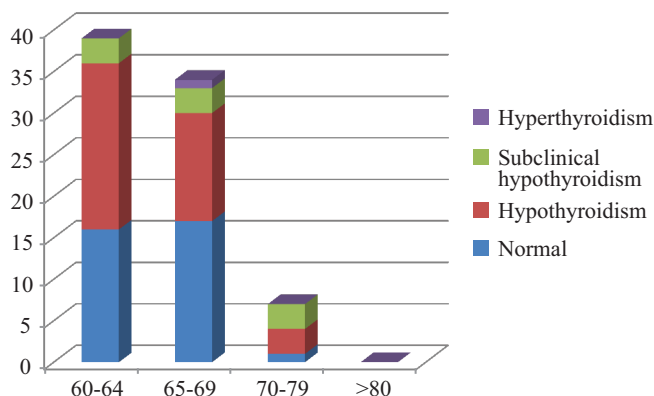


Figure-4: Correlation of Thyroid status with age distribution (Geriatric age group)

symptoms or neuropsychiatric symptoms and elevation of total and LDL cholesterol and progression to overt symptomatic hypothyroidism.¹⁹

Radaieh A.R and Nuseir M.K conducted a study at Amman, Jordan, with 908 Type 2 diabetics and 304 non-diabetics. They found overall prevalence of thyroid disease in diabetics were 12.5% of which 5.9% were known to have thyroid disease and the rest (6.6%) were newly diagnosed cases as a direct result of screening. The most common was subclinical hypothyroidism (4.1%). The prevalence of thyroid disease was 6.6% in the control group.²⁰

CONCLUSION

The study has determined that screening should be recommended for all geriatric age group patients to rule out thyroid dysfunction. In geriatric type 2 diabetics patients there was alteration in thyroid function test, so screening will prevent from major cardiovascular morbidity and mortality.

REFERENCES

- Harrison's principles of Internal Medicine; 17th edition; Vol. II:2233-2235.
- Heuck CC, Kallner A, Kanagasabapathy AS, Riesen W. Diagnosis and monitoring of the disease of the thyroid. WHO Document. 2012: pp8-9.
- Kochupillai N. Clinical endocrinology of India. *Curr Sci*. 2000;79:1061-1067.
- James R, Kumar VTV. Study on prevalence of thyroid disease in Ernakulam city and cherthala town of kerela state, India. *Intern J Sci Res Publ*. 2012;2:1-3.
- Bell GM, Sawers JS, Forfar JC et al. The effect of minor increments in plasma thyroxine on heart rate and urinary sodium excretion. *Clin Endocrinol*. 1983;18:511-516.
- Biondi B, Palmieri EA, Klain M, et al. Subclinical Hyperthyroidism; Clinical features and treatment options. *Eur J Clin Endocrinol*. 2005;152:129.
- Gray RS, Irvin WJ, Clark BF. Screening for thyroid dysfunction in diabetics. *British Med J*. 1979;2:1439.
- Hage M, Zantout MS, Azar ST. Thyroid disorders and diabetes mellitus. *J Thyroid Res*. 2011:1-7.
- Bharat HD, Gangte D, Lalnunpui, premchand, Devi I, Singh GW. Thyroid status in diabetes mellitus. *J Glycomics Lipidomics*. 2013;3:106.
- Sathish R, Mohan V. Diabetes and thyroid diseases-areview. *Int J DiabDev Countries*. 2003;23:120-123.
- WHO. Definition of an Older or Elderly person; WHO Health Statistics and Health.
- Patricia Wu. Thyroid Disease and Diabetes. *Clinical Diabetes*. 2000;18:34-40.
- Proces S, Delgrange E, Vander Borgh TV, Jamart J, Donckier JE, Minor alterations in thyroid function tests associated with Diabetes Mellitus and obesity in out-patients without known thyroid illness, *ActaClinBelg*. 2001;56:86-90.
- Cooppan R, Kozak GP, Hyperthyroidism and Diabetes Mellitus, *Arch Intern Med*. 1980;140:372-373.
- Baumann E. Ueber das normale Vorkommen von Jodim Thickerper. *Hoppe Seylers Z Physid Chem*. 1895;21:319-330.
- Savin CT, Geller A, Kaplan MM et al. Low serum thyrotropin in older persons without hypothyroidism. *Arch Intern Med*. 1991;151:165-168.
- Bahemuka, M. and H.M. Hodkinson, Screening for hypothyroidism in elderly inpatients. *Br Med J*. 1975;2: 601-3.
- Kutty KM, Bryant DG and Farried NR. Serum lipids in hypothyroidism, a re-evaluation. *J. Clinical Endocrinology – Metab*. 1978;46:55-60.
- Fox EL. A case of myxedema treated by taking extract of thyroid by the mouth. *BMJ*. 1892;2:941.
- Gull WW. On a cretinoid state supervening in adult life in women. *Trans ClinSoc Lond*. 1874;7:180-185.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 22-01-2017; **Published online:** 05-03-2017