

Prevalence of Thyroid Dysfunction in Young Patients with Type 2 Diabetes Mellitus in Eastern India, Study of 120 Cases from a Tertiary Care Hospital

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Abstract

Objective. The association between thyroid dysfunction and Type 2 Diabetes Mellitus has been reported in several studies. This study was done to explore the prevalence of thyroid dysfunction in young (<40 years) patients with type 2 Diabetes Mellitus in Eastern India.

Methodology. A retrospective chart review of 120 patients with Type 2 Diabetes Mellitus was done. 120 patients (male 81, female 39) of age <40 years, who fulfilled the diagnostic criteria for Diabetes Mellitus according to ADA (American Diabetes Association) were enrolled and investigated through performance of Thyroid Function Tests (FT4, TSH).

Results. Of 120 patients (of less than 40 years of age), 65.83% of patients had the biochemical features of thyroid dysfunction. In descending order of frequency, we found subclinical hypothyroidism in 43.33% of cases (defined by no symptoms or no clinical features of hypothyroidism but with TSH level in the range of above 5 miu/ml but below 10 miu/ml with normal FT4 level), followed by 9.2% of patients with overt hypothyroidism (either clinical features or TSH >10 miu/ml or FT4 below normal), 8.3% with subclinical hyperthyroidism (only biochemically low level of TSH <0.34 miu/ml in this study) and 5% of patients show features of clinical hyperthyroidism (clinical or FT4 level well above normal range along with low TSH).

Conclusion. A high prevalence of thyroid dysfunction in young type 2 DM patients suggests evaluation for thyroid disorder for proper management.

Key words: *diabetes mellitus, subclinical hypothyroidism, free levothyroxine, thyroid stimulating hormone*

INTRODUCTION

The International Diabetes Federation projects that 592 million individuals will have diabetes by the year 2035.^{1,2} 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.³

The association between thyroid dysfunction and DM has long been recognized. Thyroid hormones are insulin antagonists; both insulin and thyroid hormones are involved in cellular metabolism and excess and deficit of any one can result in functional derangement of the other. As diabetes is a major public health problem, any

disorder that may even be weakly associated with it merits special attention.

Very few studies are reported regarding the relationship of thyroid dysfunction in type 2 DM in young patients. The control of hyperglycaemia in the presence of underlying thyroid dysfunction, even subclinical, poses problems. Correction of thyroid dysfunction may help improve metabolic outcome in type 2 DM patients. As such, thyroid dysfunction and Type 2 DM may be interlinked. Currently there are no internationally accepted guidelines for screening of thyroid dysfunction in Type 2 DM patients. This study therefore is designed to inform the burden of dual pathological prevalence of thyroid dysfunctions in young (less than 40 years) type 2 DM patients.

e-ISSN 2308-118X

Printed in the Philippines

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Received: June 29, 2015. Accepted: October 26, 2015.

<http://dx.doi.org/10.15605/jafes.030.02.15>

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OBJECTIVES

1. To assess the thyroid abnormalities in diabetic subjects with or without symptoms of thyroid dysfunction.
2. To assess the prevalence of thyroid dysfunction based on biochemical and/or clinical features.
3. To assess the anti TPO positivity in patients with thyroid dysfunction.

METHODOLOGY

The study includes type 2 diabetics of age less than 40 years. Total of 120 patients were selected who were diagnosed as having type 2 DM in accordance with ADA criteria and evaluated with thyroid function tests (FT4, TSH).

Exclusion criteria

1. Type 1 DM
2. Type 2 DM above 40 years of age
3. Gestational DM
4. Proven thyroid disorder and under treatment
5. Very sick or critically ill patients
6. Patients who had undergone surgery of the thyroid gland
7. Patients who had exposure to radiation of the thyroid gland
8. Patients with drug-induced hyperglycemia

Data Analysis

Data analysis has been done in SPSS 19th software. Chi-square test was used in case of non-parametric value and p-value of <0.05 is considered significant.

Results and Analysis

Of the 120 patients, 81 were males (67.5%) and 39 were females (32.5%). Their average age is 35 years old. The youngest in our study was 26 years old (Figure 1).

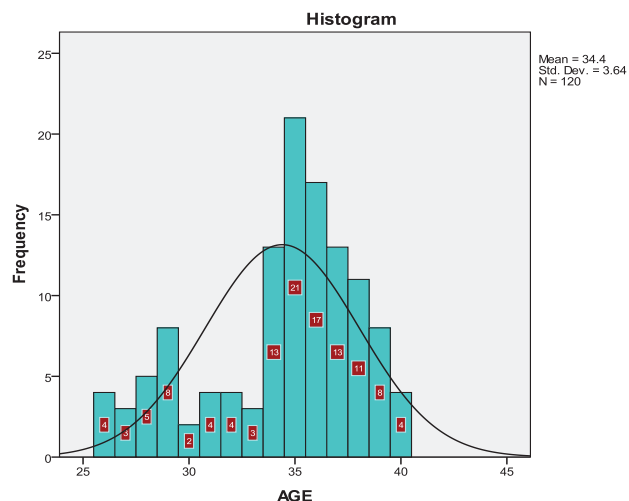


Figure 1. Distribution of age in the study population (n=120).

Average FBS level in recently diagnosed Type 2 DM population was 137 mg/dl and 95% of the population falls within the range of 130 mg/dl to 161 mg/dl (Figure 2). Average postprandial blood sugar (PPBS) in this population was 223 mg/dl with 95% of them between 190 – 234 mg/dl (Figure 3).

HbA1c prevalence in 95% (2 S.D.) of the population was within 7.5 to 8%.

Normal range for serum FT4 level is 0.7-1.24 µg/dl (standardized for all values). Figure 4 and Figure 5 showed the distribution of FT4 and TSH level in the study population.

The study revealed that 65.8% of patients (79 out of 120) have biochemical features of thyroid dysfunction. Out of the 79 patients, 63 patients have biochemical features of hypothyroidism (79.74% of patients with thyroid dysfunction and 52.5% of the total population). 16 patients have biochemical features suggestive of hyperthyroidism (20.25% of patients with thyroid dysfunction and 13.33% of the total population). Further analysis showed that 43.33% had subclinical hypothyroidism (defined by no symptoms or no clinical features of hypothyroidism but with TSH level in the range of above 5 miu/ml but below 10 miu/ml with normal FT4 level), 9.2% had overt hypothyroidism (either with clinical features or TSH > 10 miu/ml or FT4 below normal), 8.3% had subclinical hyperthyroidism (with only low level of TSH< 0.34 miu/ml) and 5% patients had overt hyperthyroidism (with clinical features or FT4 level above normal range along with low TSH) (Figure 6).

To know the prevalence of autoimmunity in thyroid dysfunction, anti-TPO test was done. The study revealed that 22 patients out of the 79 patients with thyroid dysfunction were positive for anti-TPO antibodies (27.84% of total thyroid abnormality), whereas 57 patients with thyroid dysfunction were anti-TPO negative (72.15%). 7 patients without any thyroid dysfunction showed anti-TPO positivity (17.07%).

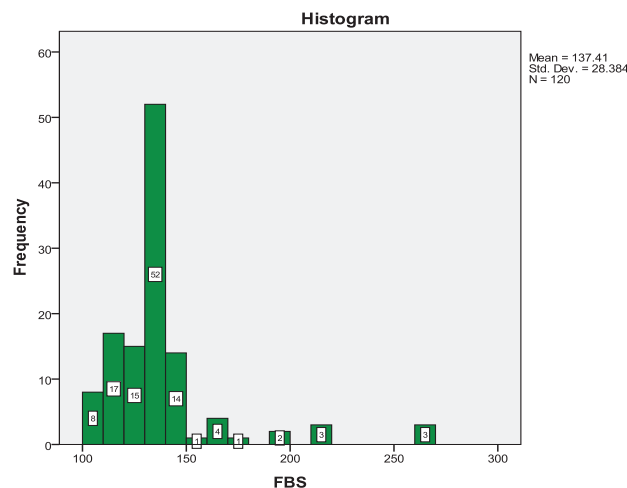


Figure 2. Distribution of FBS in the study population (n=120).

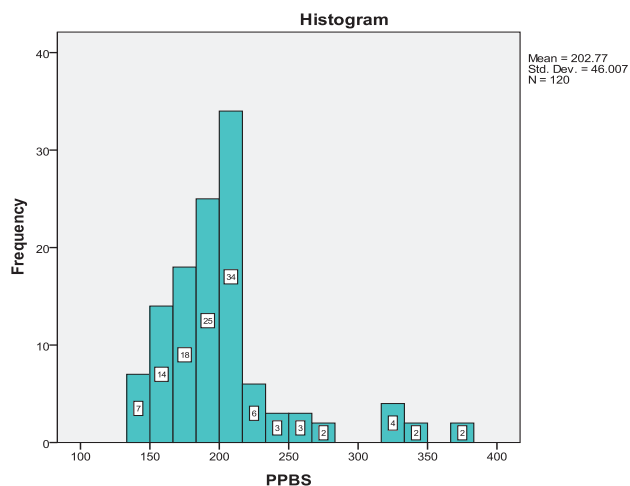


Figure 3. Distribution of PPBS in the study population (n=120).

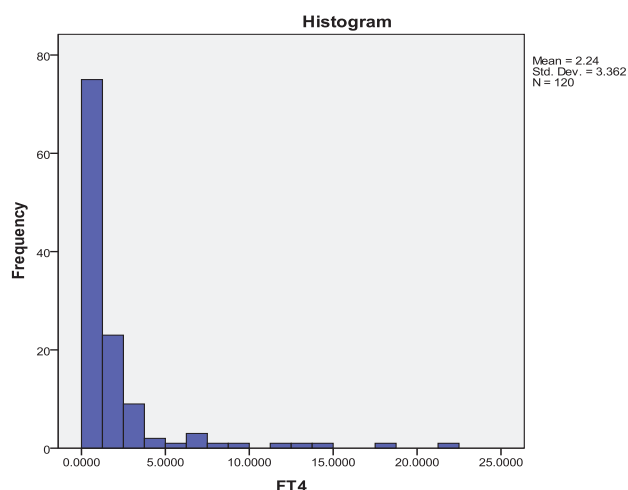


Figure 4. Distribution of FT4 level in the study population (n=120).

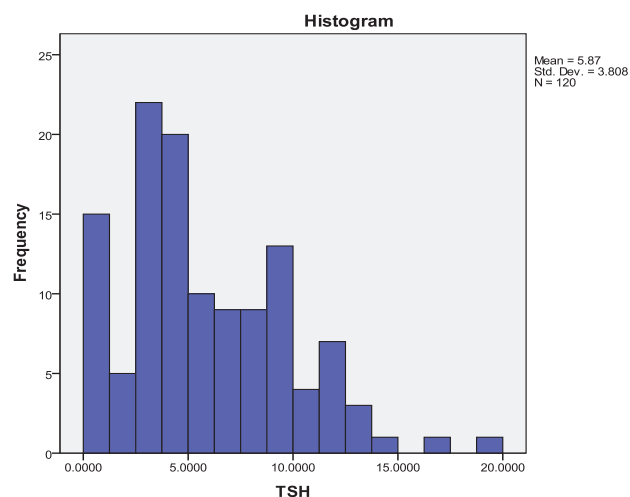


Figure 5. Distribution of TSH level in the study population (n=120).

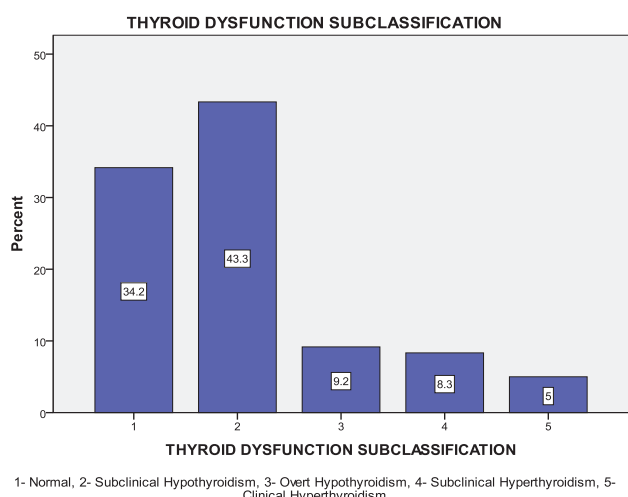


Figure 6. Thyroid dysfunction in the study population (n=120).

DISCUSSION

India will have 109 million diabetics by 2035 as projected by International Diabetes Federation.² Sequential surveys from India indicate that the prevalence of diabetes has risen steadily in the last few decades and more so in younger people.⁴⁻⁷

In our study, the average age of the study population was 35 years old which is a great burden for the society. Our study results are similar to several recent studies⁸ and previous study of our own by Mukherjee S et al⁹ in the general population. The mean age of detection of type 2 DM is 35 years in this study. This study reflects a large number of type 2 DM patients with early onset of their disease in contrast to the National Urban Diabetes Survey, carried out in six cities in 2001 in India.⁷ However, recent studies like the Chennai Population Study (CUPS) showed similar prevalence in younger generation.¹⁰

The high fasting blood sugar level in our study reflects higher level of abnormal metabolic status in this part of

India which causes more problems in maintaining normoglycaemia in younger individuals. The average PPBS in this study was almost similar to previous studies.⁹ Distribution of HbA1c in this study is consistent with several studies.¹¹ Our study revealed FT4 level has little value in screening for thyroid dysfunction as most of the patients were found to have normal levels of FT4. But TSH level is significantly abnormal in large number of patients reflecting underlying thyroid abnormality in majority of the sample population, which is similar to previous studies.¹²

This study shows that 65.8% of this young diabetic population had thyroid dysfunction which is much higher than several previous studies, though it was in accordance with Mukherjee et al reported from eastern India.⁹ This study showed much higher rate of thyroid dysfunction compared to several previous studies which showed lesser prevalence of this association and varied from 1.7% to 23% in different populations.¹³⁻¹⁶

Studies on pediatric population in India had shown higher prevalence of subclinical hypothyroidism (31.2%).¹⁷ A very

high prevalence has also been noted outside India, from Nigeria, (46.5%).¹⁸ Subclinical hypothyroidism is the most common disorder in our study (43.33%) which is similar to several studies reported.¹⁹⁻²²

CONCLUSION

This study is the first of its kind in Eastern India, showing very high prevalence of thyroid dysfunction in younger diabetics. As diabetes mellitus is currently increasingly diagnosed in the younger age group, this association has gained a new implication.

The causal association between high prevalence of abnormal thyroid hormone levels in younger diabetics is not fully understood. In our study, very high occurrence of thyroid dysfunction in younger diabetic individuals suggests a dual pathologic prevalence where autoimmunity is playing probably a minor role as evident from previous discussion.

Different studies support a biologically plausible role for hypothyroidism increasing the risk of atherosclerotic cardiovascular disease. Type 2 DM is also an independent risk factor for atherosclerotic cardiovascular disease.

This study suggests routine evaluation for thyroid screening and treatment in younger diabetics in this part of the world to prevent diverse complications of the high dual pathologic prevalence.

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