ORIGINAL ARTICLE

Frequency of Hypothyroidism in Type II Diabetic Patients

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ABSTRACT

Objective: To evaluate frequency of hypothyroidism in patients of diabetes mellitus type 2.
STUDY DESIGN: cross sectional descriptive study conducted at BMSI Jinnah Postgraduate Medical Centre Karachi.
Patients and methods: A total of 120 subjects were included in the study, 60 healthy individuals as control, from general population and 60 diagnosed type-2 diabetic patients, having 5 years of disease duration and normotensive were selected from medical wards, JPMC Karachi. Brief biodata, clinical history and physical examination were performed and recorded on proforma designed for this study. Each subject was investigated for blood pressure, fasting serum glucose, HbA_{1C}, FT_4, FT_3 and TSH. Hypothyroidism was diagnosed if FT4 was below normal range with increased TSH levels, while sub clinical hypothyroidism was diagnosed if only TSH level was elevated beyond normal range with normal FT_4 and FT_3 levels.
Results: A total 120 persons were included in the study. 60 were type 2 diabetic patients and 60 were normal control subjects. Both groups age, weight, height and body mass index were matched. In control group 27 (45%) were males and 33(55%) were females, while in diseased population 29(48.33%) were males and 31(51.66%) were females. Age of diabetic patients ranged between 25-60 (mean=45.2) years while of control subjects, it ranged 22 -58 (Mean=45.1) years. The fasting blood sugar of control group was 68 – 108 mg /dl(mean=87.38mg/dl), glycated hemoglobin was 4.2 -5.9(mean=5.23) % and TSH levels ranged between 0.24 - 3.8(mean=2.34)mIU/l. while in type 2 diabetic patients , fasting blood sugar ranged between 125-212(mean-180.82) mg/dl glycated hemoglobin was 9 - 11(mean=9.28)% and TSH levels were between 0.01 - 50(mean=17.14) mIU/l. In diabetic population 7(11.66%) patients were sub-clinical hypothyroidism and 21(35%) patients were hypothyroid.
Conclusion: Diabetes mellitus and hypothyroidism are common disorders in all populations. Frequency of hypothyroidism is more in diabetic population as compared to general population. In our population frequency is higher.
Key words: Diabetes – Mellitus – Thyroid – Hypothyroidism – subclinical.

INTRODUCTION

The functional unit of thyroid is follicle (Acini), which absorb iodine (I^-) from the blood for production of thyroid hormones i.e. triiodothyronine (T3) and thyroxine (tetraiodothyronine T4)[1]. Iodized salt users have higher levels of T3 and T4 and sometimes that can cause sub clinical/ clinical hyperthyroidism, therefore strict monitoring of thyroid hormone levels for oral salt users is recommended [2]. Thyroid disease and diabetes mellitus are quite common endocrinopathies seen in general population [3]. Thyroid disorder in general population is estimated to be 6.6%, the prevalence in diabetic population has been estimated at 10.8%. The Prevalence of sub clinical hypothyroidism is 5.4% & clinical hypothyroidism is 4.1%, while the prevalence of sub clinical hyperthyroidism is 5.8% and the clinical. hyperthyroidism is 5.1% in our population[4]

Thyroid hormone is essential for brain development[5]. In child bearing age there is an elevated level of TSH representing the deficiency of thyroid hormone, therefore TSH should be checked as soon as the pregnancy is diagnosed [6]. The classical change in hypothyroidism is due to accumulation of hyluronic acid and other glycosaminoglycans in the interstitial tissues[7]. A woman with thyroid hormone dysfunction has menstrual abnormalities, infertility and increased morbidity during pregnancy [8]. Diabetic patient with nephropathy may be complicated by primary hypothyroidism. Increased serum iodine levels play a vital role rather than an autoimmune mechanism or extra vascular hormone loss in the development of primary hypothyroidism [9]. The diagnosis of thyroid dysfunction in diabetic patients based on clinical examination is difficult, because poor glycemic control resembles the hyperthyroid features like weight loss despite increased appetite and fatigue on

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other hand diabetic nephropathy is mistaken for hypothyroidism because it manifests as oedema, fatigue, pallor and weight gain[10]. Hypothyroidism is found highly prevalent in patient with coronary artery disease and is associated with several cardiovascular risk factors[11]. There is significant difference in prevalence of thyroid disorder in diabetic subjects and normal persons, so there is early need to screen the diabetic persons for hypothyroidism or hyperthyroidism[12].

Diabetes mellitus is a group of metabolic disorder characterized by hyperglycemia due to absolute or relative deficiency of insulin, impaired action of insulin or both[13]. Type-2 diabetes mellitus is heterogeneous, multifactorial resulting from relative insulin insufficiency / insulin resistance / insulin receptors abnormalities[14,15]. In type 2 diabetes mellitus death of β cell apoptosis is blocked by an anti inflammatory substances and this could be beneficial new progress for type 2 diabetes [16]. Worldwide the prevalence of diabetes for all age groups was 2.8% in 2000 and is supposed to be 4.4% in 2030. The total number of people with DM is projected to rise from 171 million in 2000 and 360 million in 2030 [17]. Thyroid disease is also common in general population. The Whickham survey found that thyroid function affected 6.6% of adults [18]. A higher prevalence of abnormal TSH concentration in Type 2 diabetic patients (31%) was reported by Celani et al [19]. Patients with TSH level below upper normal have risk of thyroid disorders though the antibodies may be within normal limits [20]. Therefore present study was carried out to assess the frequency of hypothyroidism in type-2 diabetic patients.

STUDY DESIGN

Cross-sectional Descriptive study conducted at BMSI Jinnah Postgraduate medical centre Karachi during August 2009 To February 2010.

PATIENTS AND METHODS

A total of 120 subjects were included in the study, out of which 60 healthy individuals were selected as control, having no history of diabetes mellitus from general population and 60 diagnosed type-2 diabetic patients, having 5 years of disease duration and normotensive were selected from medical wards, JPMC Karachi.

The nature of study was explained and consent was obtained from each individual. Patients having history of type1 diabetes mellitus, liver disease, renal disease, pregnant ladies, very ill patients with complication of diabetes mellitus and those with known history of thyroid dysfunctions were excluded from study. Brief bio-data, clinical history and physical examination were performed and recorded on proforma designed for this study. Each subject was investigated for blood pressure, fasting serum glucose, HbA_{1C}, FT_4, FT_3 and TSH.

Blood samples were collected after an overnight fast of 08-10 hours from type-2 diabetics as well as from control subjects and used for determination of fasting serum glucose, glycated hemoglobin and thyroid hormone levels (FT_3, FT_4, TSH). Hypothyroidism was diagnosed if FT_4 was below normal range with increased TSH levels ; while sub clinical hypothyroidism was diagnosed if only TSH level was elevated beyond normal range with normal FT_4 and FT_3 levels.

RESULTS

A total 120 persons were included in the study. 60 were type 2 diabetic patients and 60 were normal control subjects. Both groups age, weight, height and body mass index were matched. In control group 27 (45%) were males and 33(55%) were females, while in diseased population 29(48.33%) were males and 31(51.66%) were females. Basic characteristics of both groups are presented in Table-1.

Table -1: Basic characteristics of control subjects and diabetic patients.

Characteristic	**Control subject**	**Diabetic** Pts.
Mean age	45.25 years	45.1 years
Mean height	163.11 cms.	159.24 cms
Mean weight	67.33 kgs	50.79 kgs
Mean BMI	25.20 kg/m^2	20.15 kg/m^2

Table 2: Blood sugar and thyroid hormone levels of control subjects and diabetic patients.

Characteristic	**Control subject**	**Diabetic Pts.**
Mean FBS	87.38 mg/dL	180.82 mg/dL
Mean HbA_1C	5.23 %	9.28 %
Mean FT_3	2.34 pg/dL	8.73 pg/Dl
Mean FT_4	1.11 ng/dl	2.14 ng/Dl
Mean TSH	1.68 uU/mL	17-14 uU/Ml

Age of diabetic patients ranged between 25 -60 (mean=45.2) years while of control subjects, it ranged 22 -58 (Mean=45.1) years. The fasting blood sugar of control group was 68–108mg/dl (mean=87. 38mg/dl), glycated hemoglobin was 4.2-5.9 (mean=5.23)% and TSH levels ranged between 0.24 -3.8(mean=2.34)mIU/l. while in type 2 diabetic patients, fasting blood sugar ranged between 125-212 (mean-180.82)mg/dl glycated hemoglobin was 9 –11 (mean=9.28)% and TSH levels were between 0.01 - 50(mean=17.14) mIU/l. Details are presented in Table: 2. No any person in control group had FT_3 , FT_4 , and TSH levels out of normal range. In diabetic population 7(11.66%) patients were sub-clinical hypothyroidism and 21(35%) patients were

hypothyroid. In subclinical group 3(5%) were females and 4(6.66%) were males. In hypothyroid group 14(23.33%) were females and 7(11.66%) were males.

Fig. 1: Frequency of hypothyroidism in type 2 diabetic pts.

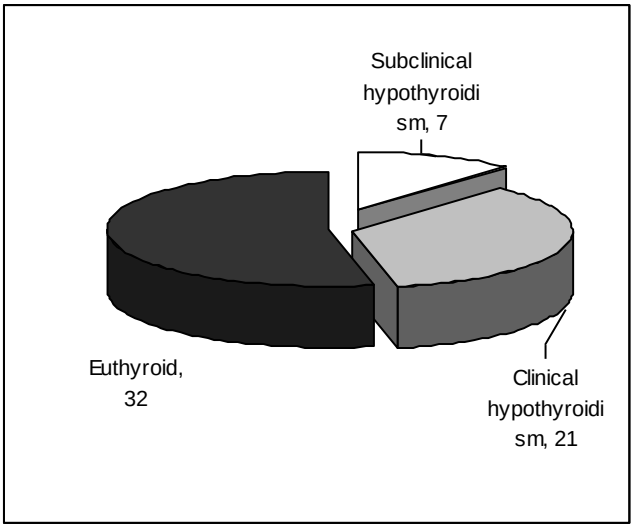
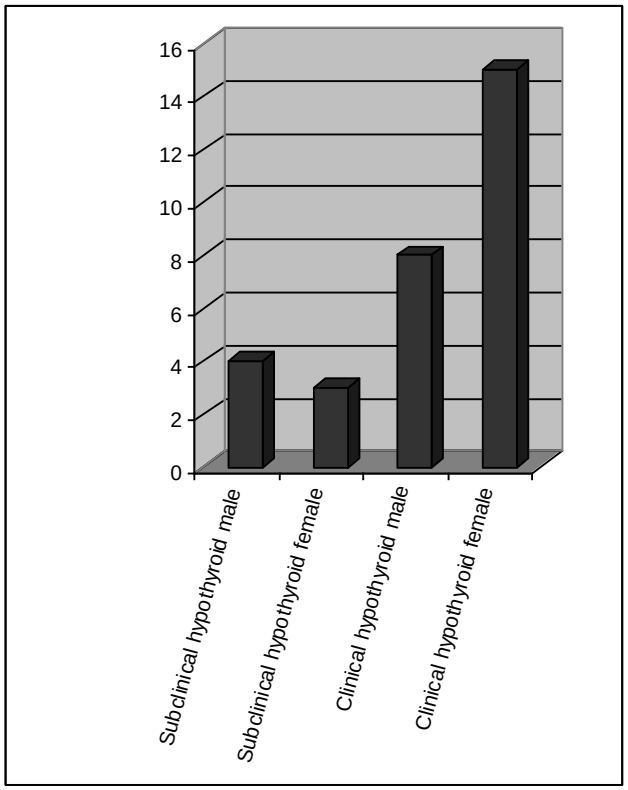


Fig. 2: Gender-wise distribution of hypothyroid patients



DISCUSSION

Thyroid is an important endocrine gland of human body and plays vital role in the normal functioning of the body. It has important effects on glucose metabolism along with lipids and protiens and conversely can be affected by abnormal glucose metabolism. Thyroid disorders either hypothyroidism or hyperthyroidism and diabetes mellitus are quite common endocrinopathies seen in general population[3]. Thyroid disorder in general population is estimated to be 6.6%, while the prevalence in diabetic population has been estimated at 10.8%. The Prevalence of sub clinical hypothyroidism is 5.4% & clinical hypothyroidism is 4.1%, while the prevalence of sub clinical hyperthyroidism is 5.8% and the clinical hyperthyroidism is 5.1% in our population [4]. The diagnosis of thyroid dysfunction in diabetic patients based on clinical examination is difficult, because poor glycemic control resembles the hyperthyroid features like weight loss despite increased appetite and fatigue and on other hand diabetic nephropathy is mistaken for hypothyroidism because it manifests as oedema, fatigue pallor and weight gain[10]. Whickham survey found that thyroid function affected 6.6% of adults[18]. A higher prevalence of abnormal TSH concentration in Type 2 diabetic patients (31%) was reported by Celani et al[19]. In our study sub clinical hypothyroidism is detected in 11.66% of evaluted diabetic patients and hypothyroidism is evident in 35% of diabetic patients which is a quite high ratio as compared to other reported data. This may be because of only concentrating diabetes mellitus and its complications rather than thinking other diagnosis partly or mis reporting by patients. So it is important to evaluate diabetic population regarding hypothyroidism whether clinical or sub-clinical, as one condition can worsen the other if left untreated by causing worsening control of diabetes mellitus , worsening dyslipidemias and causing diverse complications. Therefore it is imperative to screen diabetic population regarding hypothyroidism. More over further studies on large scale should be planned to evaluate the magnitude of the disorder.

CONCLUSION

Diabetes mellitus and hypothyroidism are common disorders in all populations. Frequency of hypothyroidism is more in diabetic population as compared to general population. In our population frequency is higher, compelling for the further large studies to confirm the magnitude of the disorder, so that diabetic patients may be prevented from further worsening complications.

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