Research Journal of Medical Science

Thyroid Dysfunction in Patients with Unregulated Type 2 Diabetes Mellitus

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Key words: Thyroid, mellitus, diabetes, type 2, TSH, uncontrolled

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Page No.: 327-330
Volume: 9, Issue 6, 2015
ISSN: 1815-9346
Research Journal of Medical Sciences

Abstract: Type 2 diabetes with hypothyroidism causes the most frequent thyroid dysfunction. The thyroid gland was known at least from the time of Galen who thought it provided a fluid for the lubrication of the larynx. About 1 year prospective case control study was conducted between August, 2012 and 2013. The thyroid is a brown, red, highly vascular organ. High incidence of thyroid dysfunction ~32.67% in the overall diabetic population was seen and even higher incidence, i.e., 53.33% was seen in the case group. In the patients with uncontrolled T2DM, sub-clinical hyperthyroidism was seen in 32%, hyperthyroidism in 18.67%, sub-clinical hypothyroidism in 1.33% and hypothyroidism in 1.33%.

INTRODUCTION

Diabetes mellitus is a group of genetically distinct metabolic defects characterized by hyperglycaemia induced from a variable combination of genetic and environmental factors and is because of defects in insulin secretion and insulin action or both (WHO, 1985). The World Health Organisation prediction of the estimates of diabetes among all age levels worldwide was 2.8% in 2000 and 4.4% in 2030 (Wild *et al*., 2004). Factors, for example, inactive way of life, dietary adjustments, ethnicity, hypertension and stoutness have prompted a sensational increment in frequency of DM, particularly in the 21st century (Zimmet *et al*., 2001). Effect of this ailment on the personal satisfaction, morbidity and mortality through the difficulties that influence the little and huge vessels, bringing about retinopathy, nephropathy, neuropathy, IHD and huge vessel block has been stressed by the discoveries of the National Commission (USA) on diabetes and DCCT preliminary. This is noted the impact on diabetes mellitus of many endocrine and non-endocrine organs other than the pancreas (Bergesio *et al*., 1996; Bando *et al*., 1999; Hilton *et al*., 2001). Other endocrine disorders such as elevated thyroid hormone rates are obtained in DM (Zimmet *et al*., 2001; Feely and Isles, 1979).

Aim: To compare the thyroid dysfunction in patients with uncontrolled type 2 diabetes mellitus and controlled type 2 diabetes mellitus.

Objectives: To determine the spectrum of thyroid hormone abnormalities in patients with unregulated type 2 diabetes mellitus and regulated type 2 diabetes mellitus.

Literature review: Diabetes was initially identified in about 1500 B.C. Ancient Egyptians, who found it a unusual disorder in which a person urinated inappropriately and lost weight (Dobson, 1976). The term ‘Diabetes’ was first used by the Greek physician Aretaeus (AD 30-90) of Cappadocia in second century. It was derived from Greek word Dia (through) and bianeon (to go), meaning a siphon, leaving it as if the patient were a siphon which described polyuria. He described the disease as “diabetes is dreadful affliction, not very frequent in men being a melting down of flesh and limbs

into urine. The patients never stop making water and the flow is incessant, like the opening of aqueducts, life is short, unpleasant and painful, thirst unquenchable, drinking excessive and disproportionate to the large quantity of urine, yet more urine is passed. If for a while they abstain from drinking, their mouths become parched and their bodies dry; the viscera seem scorched up; the patients are affected by nausea, restlessness and a burning thirst and within a short time, they expire". It was John Rollo (1809) who was the first to use the adjective 'Mellitus' (mellitus = honey) to differentiate this disorder from other polyuric conditions in which the urine was tasteless.

The thyroid is a brown, red, highly vascular organ, the 5th, 6th and 7th cervical and is located at the front and side of the lower part of the neck opposite the thoracic vertebrae. The thyroid gland was known at least from the time of Galen who thought it provided a fluid for the lubrication of the larynx. Wang Hei anatomically described the thyroid gland in 1475. Paracelsus, some 50 years later attributed the formation of goitre to mineral impurities in the water. Kocher later demonstrated that total thyroidectomy caused hypothyroidism and was awarded the Nobel Prize (Hollowell *et al*., 2002). Approximately, 16 years after Gulls report, a successful attempt at implantation of a sheep thyroid gland subcutaneously in the mammary area of a female patient suffering from myxoedema was shown to improve the condition. The case was reported by Lisbon's Betancourt, Portugal in August 1890 in a magazine called La Semaine Medicé. One year later in 1891, taking cues from this report of an improvement of myxoedema by an exogenous thyroid gland implant, British psychiatrist George R. Murray claimed that extracts of thyroid glands given to patients would be beneficial in hypothyroidism and reported the success of such a trial conducted by him on a hypothyroid female patient where hypodermic administration of thyroid extracts improved her condition (Murray, 1891). A year later, MacKenzie (1982) and Fox (1892) stated that the oral administration of fresh sheep thyroid glands and thyroid extracts has been effective in correcting the indications and symptoms of hypothyroidism in a female patient.

Diseases of the thyroid gland almost always manifest themselves through symptoms resulting due to either excessive or insufficient production of thyroid hormone. Thyroid disease is established on the clinical grounds and the functional disturbance is assessed by the metabolic state. The functional treatment of thyroid ailment depends on a carefully taken history, careful quest for the physical indications of hypo or hyperthyroidism and in an exquisite examination of the consequences of the research facility tests. Thyroid brokenness is basic in adults 14-16 and can be analyzed precisely by laboratory tests (Singer *et al*., 1995; Klee and Hay, 1997). The rules of the American Thyroid Affiliation and the 'American Association of Clinical Endocrinologists' suggest that the serum TSH calculation is the very most reliable test to evaluate any single normal form of hypothyroidism and hyperthyroidism, particularly in the ambulatory environment (Ladenson *et al*., 2000; Baskin *et al*., 2002). TSH affirms or removes the treatment of overall patients. For predominant hypothyroidism, an established TSH fixation is available in both clear and moderate hypothyroidism (Singer *et al*., 1995). Serum TSH concentrations in patients with hyperthyroidism are <0.1 mIU mL^{-1} and usually <0.05 mIU mL^{-1}. TSH Serum inside the euthyroid reference period nearly invariably prevents hyperthyroidism diagnosis (Whitley, 1998). A TSH focused strategy for the initial evaluation of thyroid function is both diagnostically successful and cost-effective (Becker *et al*., 1993; Mark and Schmittner, 1993).

MATERIALS AND METHODS

The present study covers all patients with diabetes mellitus admitted to KIMS IPD medication in Karad between August, 2012 and 2013. The 1 year, prospective case-control study. Cases-T2DM patients with an HbA1C>7 were studied in the case group.

RESULTS AND DISCUSSION

Table 1 shows the students unpaired t test was used to compare age distributions across cases and controls. Value t = 0.01866, df-148 degree, p = 0.9851. And no substantial distinction in the distribution of age of the two sample groups.

The Chi-square test was used to study the comparative prevalence of hypertension in cases and controls. Values obtained $\chi^2 = 0.02706$, df = 1, relative risk = 1.056, p = 0.8693. Prevalence of hypertension in patients of DM was independent of level of control of blood sugars. Result of these observation tabulated in Table 2. None of the patients studied was on insulin alone. No Type 1 DM patient was studied in this study.

Table 1: Distribution of age

Age distribution	Cases (n = 75)	Controls (n = 75)
20-40	05 (6.67%)	06 (8%)
40-60	34 (45.33%)	32 (42.67%)
>60	36 (48%)	37 (49.33%)
Total	75	75
Mean	59.96	59.92
SD	12.89	13.38

Table 2: Prevalence of hypertension in the cases and controls

Hypertension	Cases	Control	Total
Present	43 (57.33%)	41 (54.67%)	84 (56%)
Absent	32 (42.67%)	34 (45.33%)	66 (44%)
Total	75	75	150

There was no significant difference

Table 3: Type of on-going treatment for T2DM in the cases and controls

Study groups	OHA	Insulin	Both	None	Total
Cases	30 (40%)	0	26 (34.67%)	19 (25.33%)	75
Controls	33 (44%)	0	9 (12%)	33 (44%)	75
Total	63 (42%)	0	35 (23.33%)	52 (34.67%)	150

Table 4: Thyroid disorders in cases and control

Study groups	Hypothyroidism	Sub-clinical hypothyroidism	Normal	Sub-clinical hyperthyroidism	Hyper-thyroidism	Total
Cases	1 (1.33%)	1 (1.33%)	35(46.67%)	24 (32%)	14 (18.67%)	75
Controls	0	1 (1.33%)	66 (88%)	7 (9.33%)	1(1.33%)	75
Total	1 (0.6%)	2 (1.33%)	101 (67.33%)	31 (20.67%)	15 (10%)	150

The 34.67% cases obligatory both OHA's as well as insulin. Only 12% controls required both (Table 3). As shown in Table 4, sub-clinical hyperthyroidism was the predominant finding-32% cases and 9.33% controls. Hyperthyroidism was seen in 18.67% cases and 1.33% controls. Hypothyroidism was seen in very small percentage of cases only-1.33%. The 1.33% of patients and 1.33% of controls were presented in sub-clinical hypothyroidism.

In this study, we observed a substantial rise in the occurrence of thyroid disease as age rises. The incidence of thyroid disease was strongest in diabetic Type 2 patients over the age of 60 years in all instances and controls. The NHANES III report (Hollowell *et al*., 2002), surveying of 17,353 people reflecting the US populace, also reported significant findings. Udiong *et al*. (2007) have observed that the occurrence of thyroid deficiency increased rising with the age of diabetics. Pasupathi *et al*. (2008) study, in the case group, T3 was substantially elevated relative to the control group. Our study was done in controlled and uncontrolled type 2 diabetics. Pasupathi *et al*. (2008) study was done in diabetics and non-diabetics. It was significant in the study of Pasupathi *et al*. (2008) and Udiong *et al*. (2007) also the study did not show the same significance. In a study by Gonem *et al*. (2007) screening of 959 patients comprised 3 cases of hyperhyperthyroidism and 32 (3.3%) cases of subclinical hyperthyroidism. The 25 patients (2.6%) had an elevated TSH.

CONCLUSION

High occurrence of thyroid dysfunction is found in patients with unregulated T2DM. Subclinical hyperthyroidism was a prevalent form of intrinsic thyroid disease observed in patients with unregulated T2DM. Underlying hyperthyroidism in Patients of T2DM of serious worsening of glycemic function should be treated. For T2DM patients with hyperthyroidism, doctors need to predict potential loss in glycemic function and change medication doses accordingly. Incidence of thyroid dysfunction in T2DM patients increases with age. Incidence of thyroid dysfunction between the two sexes was not highly variable. The longer the duration of T2DM in a patient, the greater the probability of uncontrolled blood sugar and the greater the likelihood of thyroid dysfunction.

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