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Incidence of thyroid disease in young type 1 diabetics: Is the disease burden significant?

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ABSTRACT... Objective: The aim of this study is to determine the frequency of thyroid disorders in patients with type-I diabetes mellitus. **Study Design:** Descriptive Cross-sectional study. **Setting:** Jinnah Medical College Hospital, Karachi. **Period:** 3rd January 2018 to 3rd July 2018. **Material & Methods:** A total number of hundred patients having NIDDM taking insulin were included and thyroid hormones were measured. **Results:** Out of hundred patients, 57 were male and 43 were female. Mean age was 12 to 20 years. Thirty-four (34%) of patients had a family history of type-I diabetes. The mean (\pm SD) age of patients when the type-I diabetes first diagnosed was 12(\pm 3.08) years. A total of 6% patients had a thyroid dysfunction. Thyroid antibodies were negative among patients with deranged thyroid hormones and ultrasound thyroid gland was also normal. **Conclusion:** There is significant association of thyroid disorders with type-I diabetes mellitus. Frequent screening was recommended in these patients.

Key words: Diabetes Mellitus, Thyroid, Thyroid Hormone, Insulin, NIDDM.

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INTRODUCTION

Diabetes Mellitus (DM) is a cluster of metabolic disorder where glucose is underutilized resulting in hyperglycemia.

Diabetes Mellitus (DM) is now a leading source of morbidity and mortality all over the world.

According to revised classification, insulin dependent diabetes Mellitus (IDDM) and non-insulin dependent diabetes Mellitus (NIDDM) are described as type-I and type-II respectively.¹

There is a thorough association of type-I diabetes with other autoimmune endocrine diseases.¹ The autoimmune process causing type-I diabetes begins far long before the clinical appearance and needs 80% to 90% decrease in volume of beta cells of the pancreas to bring about clear manifestation of disease.

Thyroid microsomal antibody (TMAb) was found in sera of 50% of IDD and 27% of these seropositive patients were suffering from hypothyroidism.¹

In the third national health and nutrition examination survey (NHANES-III), 17353 people reported prevalence of hypothyroidism in 4.6% and hyperthyroidism in 1.3%.²

In type 1 diabetics, prevalence of hypothyroidism in 12-24% of female and 6% of male is reported. Hyperthyroidism on the other hand occurs in 1-2% of diabetic patients.²

American thyroid association guidelines recommend screening for autoimmune thyroid disease in suspected patients.³ Individuals with type-I diabetes have a high risk of having autoimmune thyroid dysfunction.⁴ Cross sectional studies in childhood have demonstrated prevalence of thyroid dysfunction 3-7%.⁵

Chronic lymphocytic thyroiditis (Hashimoto thyroiditis) is more closely linked with type-I diabetes. The prevalence is 2-20 times more than control population. A TSH value of greater than 10umol/ml indicates current or incipient thyroid dysfunction that warrants substitutions with

thyroid hormone. After treatment with L-thyroxin, growth speed increased in prepubertal patients.⁶

The aim of my study was to evaluate Thyroid stimulating hormone (TSH) & Thyroxin (T_4) concentrations in sera of type-I diabetic patients to analyze the frequency of thyroid dysfunction at Jinnah Medical College Hospital, Karachi.

MATERIAL & METHODS

A descriptive cross-sectional study was conducted in the Department of Medicine at Jinnah Medical College Hospital (JMCH), Karachi during six months from January, 2018 to July, 2018.

One hundred patients were diagnosed with type-I diabetes mellitus (By using formula, assuming 3-7% ($p=0.07$) prevalence of thyroid dysfunction in type-I diabetics, $n=p*(1-p)*Z/E^2 = (0.07) (1-0.07) (1.96) / (0.05)^2 = 51$ is adequate sample for this study) by Non-probability, convenience sampling.

INCLUSION CRITERIA

- Age > 12 years
- Diagnosed type-I diabetes mellitus cases
- Presently insulin dependent for control of diabetes.

EXCLUSION CRITERIA

- Patients having congenital thyroid dysfunction
- Patients having primary thyroid disease

Type-I diabetes mellitus patients will be taken from both in and outpatient department of Pediatric & Medicine at Jinnah Medical College Hospital, Karachi after taking informed consent from the parents / guardian if required to prevent the confounders.

RESULTS

A total of 100 patients having type-I diabetes mellitus (aged > 12 years) were included in this study. 57% were male and 43% were female (M: F = 1.3: 1).

Mean (\pm SD) age of patients was 16 (\pm 3.09) years (Range = 12 – 20 years). 44% patients were aged between 12-15 years followed by 38% patients among 15 – 18 years and only 15% patients belonged from 19 – 21 years age group.

Family history of type-I diabetes had been among 34% patients while 66% patients had no family history of type-I diabetes.

According to the initial presentation 80% patients had classical diabetes, 19% patients had DKA while only 1% patients had incidental diabetes.

Mean (\pm SD) age of patients at the time diabetes type-I was first diagnosed was 16 (\pm 3.08) years (Range = 12 – 20 years) shown in Figure.

Six (6%) patients were diagnosed with thyroid dysfunction, (among which 2% subjects developed hyperthyroidism and remaining 4% had hypothyroidism) shown in Table.

Insignificant association was seen between gender and thyroid dysfunction (p -value = 0.986), out of six positive subjects of thyroid dysfunction 3 were male and 3 were female.

Chief symptoms include Polyuria in 90% patients, Polydipsia in 85% patients and Polyphagia in 80% patients while vomiting was seen in only 20% patients.

An insignificant association was also seen between hypo – hyperthyroidism and gender (p -value = 0.733).

A total of 6% patients had thyroid dysfunction among which 2% subjects developed hyperthyroidism and remaining 4% had hypothyroidism. Thyroid antibodies were negative in patients with deranged thyroid hormones and ultrasound thyroid gland was also normal.

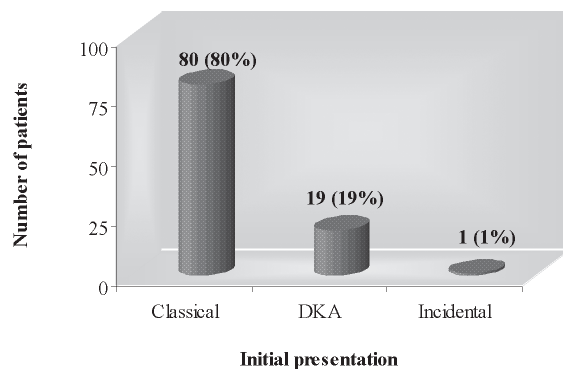


Figure-1. Initial presentation when type 1 diabetes first diagnosed n = 100

Keys: Classical = _____, DKA = _____, Incidental = _____,

Thyroid	Number of Patients (%)
Positive (n=06)	
Hyperthyroidism	2 (2)
Hypothyroidism	04 (4)
Negative	94 (94)

Table-I. Frequency of thyroid in type-I diabetic patients n = 100

DISCUSSION

The study was conducted in Jinnah Medical College Hospital, Karachi which comprised of hundred patients during six months study period. There is a strong association of type-I diabetes mellitus with thyroid disorders. The autoimmune process causing type-I diabetes mellitus begins years before the clinical presentation. There is a significant correlation of autoimmune disorders in them. Patients involved in our study were greater than 12 years of age, 57% males and 43% females, there was no difference of gender with deranged thyroid hormone levels.

Thyroid hormones were deranged in six patients with type-I diabetes mellitus considering 6% percent compared with Ditta A¹ who showed 30% of patients had deranged thyroid hormones levels. These patients show subclinical thyroid dysfunction because there was no patient who had goiter or any thyroid dysfunction.

Four of our patients had increased levels of TSH and two patients had raised T₄ with reduced

TSH levels. Patients having deranged thyroid hormones had non palpable goiter in them. Thinking of thyroid dysfunction, thyroid antibodies was done in those patients and there was no positive result. Ultrasound thyroid gland was also normal in those patients.

Radaideh AR et al⁷ found 7 cases (8.9%) of thyroid dysfunction in their study, four of them were diagnosed as subclinical hypothyroidism where as other three had overt hypothyroidism and were on thyroid replacement therapy, while 6% of patients had deranged thyroid hormones and none of them had overt hypothyroidism and were not taking any thyroid replacement therapy.

Fernandez-soto et al⁸ reported that pregnant women with type-I diabetes and positive anti-TPO before gestation had significantly raised HbA1c values and insulin requirement during pregnancy than those without thyroid antibodies.

Chase et al⁹ documented decreased rate of growth in diabetic patients with high TSH values and thyromegaly, but euthyroid serum hormone levels. Treatment with L-thyroxine improved growth significantly in prepuberal patients as compared to age matched diabetic controls.

Dayan et al¹⁰ recommended treatment if adult patient have any symptoms attributable to hypothyroidism, presence of a TSH >10mU/l or belonging to a high-risk group for development to overt hypothyroidism (strongly positive test for anti-TPO, an age >45 or male gender).

Vander pump PMJ et al¹¹ found that an increase in serum TSH above 2mU/l predicts greater rates of progression to overt hypothyroidism.

Hansen D et al⁵ reported 5% of patients had thyroid dysfunction consistent with our study.

Yasmeen T et al¹² noticed that there is no strong association between blood glucose level and FT4 and TSH level that is consistent with our study.

In 4 patients with elevated TSH levels suspected of having hypothyroidism while 2 patients with

raised T_4 concentration suspected of having hyperthyroidism needs consistent screening for thyroid hormones, thyroid antibodies and other thyroid invasive procedures to detect thyroid dysfunction.

CONCLUSION

In conclusion, the risk of developing autoimmune thyroid disorders in young type-I diabetes patients, may legitimate annual screening of s-TSH in all diabetics. We can say that thyroid autoimmune process seems to be correlated with type-I diabetic patients and should be kept under constant thyroid screening by physicians.

CONFLICT OF INTEREST


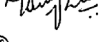



The authors declare no competing interests.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
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2	Syeda Urooj Riaz	Data collection, Analysis, Proof reading.	
3	Om Prakash	Conception, Analyzing.	
4	Dileep Kumar	Analyzing, Data collection.	
5	Ishaq Ghauri	Analyzing, Proof reading.	
6	Asad Raza Jafri	Data collection, Analysis.	