



ORIGINAL RESEARCH PAPER

Medical Science

STUDY OF SERUM T3 , T4 , TSH LEVEL IN CASES OF TYPE 2 DIABETES MELLITUS

KEY WORDS: Diabetes Mellitus, Euthyroid, Low T3 Syndrome, T4- 5 Deiodinase

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ABSTRACT

INTRODUCTION

Thyroid disorders are also quite common in the general population and it is second only to Diabetes as the most common condition to affect the Endocrine system . As a result it is common for an individual to be affected by both Thyroid Diseases and Diabetes . the first report in this regard was published in 1979 . Thyroid hormones are insulin antagonists , both insulin and Thyroid Hormones are involved in cellular metabolism and excess and deficit in anyone can result in functional derangement of the other . Thyroid disease is a pathological state that adversely affects Diabetes control and is commonly found in most forms of DM which is associated with advanced age in type2 diabetes and Autoimmune diseases in type1 .DM appears to influence Thyroid function in two sites : firstly at the level of Hypothalamic control of TSH release and secondly at the conversion of T4 to T3 in the peripheral tissue . Marked hyperglycemia causes reversible reduction of activity and hepatic concentration of T4- 5 deiodinase , low serum concentration of T3 , Elevated levels of reverse T3 and low , normal or high levels of T4 . It has generally been accepted that the serum T3 level is diminished in patients of type 2 DM referred to as Low T3 Syndrome . , clinically remain Euthyroid .

AIMS & OBJECTIVES

- 1) To evaluate the actual alternation of serum T3 and T4 and TSH in Patients Of Diabetes Mellitus.
- 2) To evaluate the utility of screening for thyroid function in clinically Euthyroid . Patients of Diabetes Mellitus who are considered as at risk group with subclinical Hypothyroidism .

CONCLUSIONS

From the statistical data it was evident that there was no significant difference between the mean serum T4 levels of control subjects and that of Diabetic PATIENTS .

The mean serum T3 levels were similar in GROUP A & B Diabetics but were significantly lower than corresponding ages of control subjects . Thus the Diabetics in the present study although clinically Euthyroid show a low level of circulating T3 to which the term low T3 syndrome has been given .

Introduction

According to WHO at least 347 million people worldwide have Diabetes . WHO projects that Diabetes will be the 7th leading cause of death in 2030 . India is facing an epidemic of diabetes . At present , confirmed diabetic patients in india are 67 million with another 30 million in prediabetic group by 2030 . India will have the largest number of patients in the world .

Thyroid disorders are also quite common in the general population and it is second only to Diabetes as the most common condition to affect the Endocrine system . As a result it is common for an individual to be affected by both Thyroid Diseases and Diabetes . the first report in this regard was published in 1979 .

Thyroid hormones are insulin antagonists , both insulin and Thyroid Hormones are involved in cellular metabolism and excess and deficit in anyone can result in functional derangement of the other . Thyroid disease is a pathological state that adversely affects Diabetes control and is commonly found in most forms of DM which is associated with advanced age in type2 diabetes and Autoimmune diseases in type1 .DM appears to influence Thyroid function in two sites : firstly at the level of Hypothalamic control of TSH release and secondly at the conversion of T4 to T3 in the peripheral tissue .Marked hyperglycemia causes reversible reduction of activity and hepatic concentration of T4- 5 deiodinase , low serum concentration of T3 , Elevated levels of reverse T3 and low , normal or high levels of T4 . It has generally been accepted that the serum T3 level is diminished in patients of type 2 DM referred to as Low T3 Syndrome . , clinically remain Euthyroid .

Aims and objectives

- 1) To evaluate the actual alternation of serum T3 and T4 and TSH in Patients Of Diabetes Mellitus.
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Material and methods

The Material in the present study comprised of 60 Patients of Diabetes Mellitus selected irrespective of their age and sex from the medical indoor wards of Darbhanga Medical College& Hospital , Darbhanga admitted either from opd or casualty during the period of march 2017 to November 2018 . These patients were treated either by insulin injections or OHAs .

Patients with clinical and Biochemical evidence at Hepatic or renal dysfunction as well as those with other significant diabetic complications were excluded from this study . None of these patients were ketotic or acidotic .

None of these patients were taking any medication other than insulin or sulfonylureas .

All these patients were clinically Euthyroid at the time of assessment and had no history s/o Thyroid disease .

The diabetic patients were divided into 2 groups according to type of therapy as follows

- Group A – receiving sulfonylureas
- Group B – receiving insulin injections

25 healthy subjects were selected irrespective of age and sex from the attendants of the indoor patients , Hospital staff , House Physicians and Medical students . All these subjects were clinically Euthyroid at the time of assessment and there was no history suggestive of thyroid disease .

None of these subjects were taking any drugs including OCPs .

Method

- 1) Detailed history was taken from each individual with special reference to the duration of DIABETES MELLITUS . Any symptoms s/o Hyperthyroidism (like intolerance of warm environments , Anxiety, Palpation and Increased Bowel

movements) and Hypothyroidism like increased sensitivity to cold , constipation , Gain in weight , Tiredness , Vague Generalized Pain , Deafness , Forgetfulness , Tingling of Fingers was also Inquired .

- 2) Physical examination was done with special reference to detect any clinical sign s/o diabetic complications involving neuropathy , nephropathy , retinopathy , and peripheral vascular disease .
- 3) Physical examination of Thyroid gland for any evidence of goiter was done on each subject at the time of assessment .
- 4) Assessment of Diabetes Mellitus was done in Each case of Estimating Fasting Blood sugar level and 2 hours Post Prandial .
- 5) HORMONE ANALYSIS:- Serum concentration of T4, T3, & TSH were determined by using automated analyser – Immunochemiluminimetric Analyser (ICMA) (ADVIA CENTAUR).

Observation

Types of	Total no of subjects	Sex distribution	Percentage in each
Diabetes	60	Male-40 Female-20	66.6% 33.3%
Control	25	Male-17 Female-8	68% 32%

This table shows similar percentage of each sex in both diabetes and control .

Age distribution of subjects

	Diabetes	Control	t-value	p-value
Age range	18-68	18-61		
Mean of range	44.59	37.39	1.72	>0.05
S.D	+/-12.44	+/-13.39		

The above table shows that the lower limits of age is similar in both the groups . Although the upper limit is higher in Diabetes , the difference between the mean age of the two groups is significant .

Study of serum thyroid hormone levels among the control subjects

	Serum T3 levels(ng/ml)	Serum t4 levels (mcg/dl)
Range	0.69-0.74	6.5-10.6
Mean	0.72	8.025
S.D	+/-0.136	+/-0.795

The highest serum T3 level was 0.74ng/ml whereas the lowest T3 level was 0.69 ng/ml . the highest T4 level was 10.6mcg/dl and the lowest level was 6.5 . the mean T3 level in group A patients is lower than the normal value .

Comparison of serum thyroid hormones (t3) level in diabetes with those of controls

	Group A diabetics	Controls	T value	P value
Range	0.69-0.74	.78-.98	3.38	<.01
Mean	.73	7.72		significant
S.D	+/-0.136	+/-0.56		

Table shows that the mean serum T3 levels in group A Diabetes is significantly lower than that of controls .

The mean value of serum T4 in this study is similar in diabetes group and that of controls .

The fasting as well as the post prandial sugar levels are almost similar in group A and group B diabetics .

Summary and conclusion

In the present study 60 cases of Diabetes Mellitus and 2 normal age matched controls were selected for the study of Thyroid hormone levels . Estimation of serum T3 and T4 were done by RIAs . The Diabetic Patients were divided into 2 groups according to mode of therapy . Out of 60 cases of diabetes mellitus , 20 were being treated by sulfonylureas and 40 patients were treated by insulin injections and all were Euthyroid clinically .

The normal subjects selected for comparison were biochemically free from Diabetes Mellitus or any other condition that might affect the serum Thyroid Hormone levels such as malnutrition , Hepatic disorder , Renal disorders and Pregnancy . None were receiving any drug that might alter thyroid levels eg . dexamethasone , propranolol , amiodarone , ocp .

The diagnosis of diabetes mellitus was done by estimation of blood glucose level by glucose oxidase peroxidase method.The mean blood sugar level in GROUP A PATIENTS was 152(FASTING) and 228(POSTPRANDIAL) and GROUP B was 153 and 233 .

The Results of Estimations of serum T3 and T4 levels in control subjects as well as in diabetic PATIENTS has been summarized in the table below

		Controls	GrpA	GrpB
SERUM T3	RANGE	.75-.98	.69-.74	.71-.85
	MEAN	.86	.72	.73
	SD	+/- .056	+/- .136	+/- .03
SERUM T4	RANGE	6-10	6.5-10.6	5.6-11.2
	MEAN	8.13	8.025	7.72
	SD	+/-1.15	+/- .795	+/-1.56

From the statistical data it was evident that there was no significant difference between the mean serum T4 levels of control subjects and that of Diabetic patients.

The mean serum T3 levels were similar in GROUP A & B Diabetics but were significantly lower than corresponding ages of control subjects . Thus the Diabetics in the present study although clinically Euthyroid show a low level of circulating T3 to which the term low T3 syndrome has been given .

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