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ORIGINAL ARTICLE

Assessment of Thyroid Profile in Diabetes Mellitus Type 2 Patients at LUMHS, Jamshoro/ Hyderabad

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ABSTRACT

OBJECTIVES: To assess status of thyroid functions among the type 2 diabetic patients.

METHODOLOGY: This cross-sectional comparative study conducted in Department of Physiology LUMHS, in collaboration with Diabetic clinic and diagnostic research laboratory of LUMHS, Jamshoro from September 2015 to February 2016. Sampling technique was non probability sampling. The volunteers recruited in the study were one hundred two (n,102) type 2 diabetic patients and one hundred two (n,102) non diabetic individuals. Thyroid stimulating hormone (TSH) and thyroid hormones (T3 and T4) were measured using autoanalyzer by Cobas e411, Roche. The data analyzed on SPSS version 16.0 and the p value less than 0.05were reflected statistically significant.

RESULTS: Mean age of study participants was 45.85 years±9.08 in this research study. The mean and standard deviation of T_3 among type 2 diabetic and non- diabetic groups were 1.144ng/ml± 0.38 and 1.145ng/ml±0.36 respectively with insignificant difference (p value = 0.98). However, the mean± standard deviation of T4 levels among type 2 diabetic and non- diabetic groups were 7.13 µg/dl±1.95 and 7.33 µg/dl±2.0 respectively with non-significant difference (p value = 0.98). Instead, there was statistically noteworthy difference of TSH between type 2 diabetic and non-diabetic people (p value revealed to be <0.01). Mean ± standard deviation of TSH was 6.42 µU/ml±1.36 and 1.87 µU/ml±1.30 among type 2 diabetic patients and non- diabetic healthy individuals respectively. Thyroid dysfunctions found to be 18% among type 2 DM patients.

CONCLUSION: It has been concluded from this research that there is a significant variance of TSH levels among type 2 diabetic patients and non-diabetic healthy individuals.

KEY WORDS: Type 2 diabetes mellitus, Non-diabetic healthy individuals, thyroid functions

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is the universal rampant condition that is linked to peaked health expenses, as well as curtailed quality of life[1]. Diabetes mellitus (DM) is a pool of metabolic conditions, characterized by hyperglycemia that result from either due to the defects in secretion of insulin or resistance of insulin action or may be both. The wide-reaching prevalence of DM is estimated to be 366 million people worldwide[2].

Thyroid dysfunctions are more expected to arise among DM patients than general healthy population. It is proposed by the research that assessment of thyroid functions should be done in high-risk conditions as a slice of wide-ranging management among the T2DM patients[3].

The ratio of disturbed thyroid functions is greatly extensive among diabetic population and estimated to be between 6.9% and 16 percent DM has impact on thyroid function on two locations; first at the level of hypothalamic regulation of release of thyroid stimulating hormone (TSH) and other at the level of peripheral tissue where conversion of thyroxine (T4) to tri-iodothyronine (T3) take place. Both DM and hypothyroidism are major endocrine disorder leading to hyperlipidemia,[4] so T2DM remains associated to augmented cardiac morbidity and ultimately to increased mortality rate[5]. Both DM and thyroid disorders are the two utmost combined syndromes of endocrine system. Great proportion of T2DM patients suffer from never diagnosed thyroid illnesses. Subclinical hypothyroidism has been discovered as the furthermost common thyroid ailment among type 2 diabetic patients[6].

Dyslipidemia, elevated LDL levels, and osteoporosis are most frequent among patients with disturbed thyroid function when compared with those having normal thyroid functions. Thyroid dysfunctions remain underdiagnosed among elderly type 2 diabetic patients[7]. The metabolic control of diabetic patients may be impaired among untreated cases and this association can have important repercussions on the outcome of both of these disorders[8]. This is typically challenging to diagnose clinically thyroid deviations among the diabetic individuals because features of thyroid deviations may pretend symptoms of DM and its complications. Consequently, assessing prevalence of thyroid dysfunctions among the patients of T2DM would support improved control of DM as well as its complications[9]. Thyroid function tests should be recommended for screening yearly in DM patients to be distinguished from subclinical asymptomatic thyroid disorders. The rationale of this research project was to generate evidence about eminence of thyroid profile among T2DM patients and to produce cognizance among such people regarding significance of screening thyroid functions among T2DM patients. In upcoming times, this research study may benefit to improve the strategies as well as policies to screen such diabetic cases earlier and to be treated and coped timely.

METHODOLOGY

This cross-sectional comparative study conducted in Department of Physiology at LUMHS, Jamshoro in collaboration with Diabetic OPD of Liaquat University Hospital Hyderabad / Jamshoro and Diagnostic and Research Laboratory LUMHS, Jamshoro from September 2015 to February 2016. Sampling technique was non probability sampling. According to a research published in JPMA[10], prevalence of type 2 DM patients in Pakistan was 11.77%, taking 95% confidential interval and 5% margin of error, calculated sample size was 102 (n=102) type 2 DM patients and for comparison 102 non diabetic included. So that, total 204 volunteers were included in this research project and separated into two sets, (102 type 2 diabetic) and (102 non diabetic). Both male and female, young adults diagnosed patients of T2DM who never taken the drugs affecting thyroid profile were recruited for this research project. Inclusion Criteria for controls were both male and female healthy young individuals having blood sugar fasting (BSF) normal after two readings of BSF on two different occasions according to WHO criteria. The persons suffering from former endocrine pathology, diagnosed cases of type 1 DM, those who are taking lipid dropping drugs, having pregnancy, with past history of thyroid dysfunctions, taking the drugs altering thyroid functions as well as, also the diseases disturbing levels of thyroid hormones i.e., Cerebrovascular, cardiovascular, neurological and hepatic diseases, chronic kidney disease, asthmatics were excluded for this research study.

After subsequent consents and later taking aseptic measures; five ml intravenous blood samples were taken from the volunteers meeting the inclusion criteria. Then for biochemical analysis purpose, these blood samples sent to the laboratory to measure the TSH, T3 and T4 levels. Serum parted and then deposited at temperature of -20^0c till investigated. Biochemical analyzer used for biochemical analysis was Cobas e411 by Roche, by means of electro chemiluminescence skill rendering to the instructions of producers. Patients were labeled as subclinical hypothyroidism when T 3 levels were 0.58 to 1.59 ng/ml, T4 levels found 4.87^o 11.27 µg/dl with TSH > 4.00 µU/ml. The patients considered as suffering from clinical hypothyroidism if T3 levels revealed less than 0.58 ng /ml, T4 levels less than 4.87 µg/dl and TSH more than 4.0 µU/ml.

Data analyzed on statistical package of social sciences (SPSS) version 16.0. Frequencies with percentage calculated for descriptive data while quantitative variables documented as mean with standard deviation. Outcome modifiers organized by stratifying both age as well as gender. For relating qualitative data, chi square test applied. The p-value ≤ 0.05 were reflected statistically significant.

RESULTS

Entire 204 (n=204) volunteers were included in this research project and separated into two sets, (102 type 2 diabetic) and (102 controls). In each set, further males and females separated equally. Mean of the age with standard deviation of study participants was 45.85years ± 9.08. The mean ± standard deviation of T_3 among type 2 diabetic and control non diabetic groups were found to be 1.14ng/ml ± 0.38 and 1.14ng/ml±0.36 respectively with unimportant variance (p value = 0.98). However, the mean of T4 levels among type 2 diabetic and non-diabetic groups were 7.31µg/dl±1.95 and 7.35±2.0 respectively with non-significant alteration (p value = 0.98). Instead, it has been observed that statistically significant variance exists of TSH between type 2 DM group and non-diabetic controls with p value less than 0.01with the mean values 6.42µU/ml ± 1.36 and 1.87µU/ml ± 1.30 among type 2 DM patients and control groups correspondingly. **Table I.**

Table No. I: Mean age, T3, T4 and TSH among the study population (n=204)

Study Population	N	**Parameters**	**Mean± Std Deviation**	**p-value**
Type 2 DM Patients **Non-diabetic**	102 102	Age (in years)	46.49±9.92 45.22±8.15	0.317
Type 2 DM Patients **Non-diabetic**	102 102	T3(ng/ml)	1.144±0.38 1.145±0.34	0.98
Type 2 DM Patients **Non-diabetic**	102 102	T4(µg/dl)	7.31±1.95 7.35±2.05	0.89
Type 2 DM Patients **Non-diabetic**	102 102	TSH(µU/ml)	6.42±1.36 1.87±1.30	0.001

In this study, occurrence of thyroid disease revealed to be 18% among 102 type 2 diabetics while maximum among female gender (11.8%). Among the diabetics, 7.8% were suffering from subclinical hypothyroidism. Two percent (2%) diagnosed as subclinical hyperthyroidism as well as one percent as hyperthyroidism. Female diabetics are more disposed to develop thyroid dysfunctions. **Table II.**

TABLE II: THYROID STATUS AMONG TYPE 2 DIABETIC GROUP (n = 102)

Thyroid status	**Type 2 DM patients**			
	Male n = 51	**Female n = 51**	**Total n = 102**	***P* value**
Euthyroidsm	48(94.1%)	42(82.4%)	90(88.2%)	
Subclinical hypothyroidsm	2(3.9%)	6(11.8%)	8(7.8%)	
Hypothyroidsm	1(2.0%)	2(3.9%)	3(2.9%)	0.029*
Hyperthyroidism	0	1(2.0%)	1(1.0%)	

DISCUSSION

DM and thyroidal illness both are the major global issues related to endocrine system apparent in largely population. The association between DM and thyroid dysfunction had been documented and published previously. Screening for thyroid profile among DM patients can possibly improve incident recognition as well as timely management, ultimately foremost towards better thyroid specific management as well as prevention from further DM complications[11].

Among general population, thyroid illnesses range from 6.6 to 13.4 percent.[5] Instead, among DM patients, the prevalence of thyroid disorders observed to be varying from 10 to 24%. However, this study found the occurrence of entirely types of undiagnosed thyroid disorders to be 18.3%[6] Peak level of TSH with low levels of T3 has been detected in T2DM. Routine monitoring of thyroid in DM patients is necessary, and management of thyroid dysfunction may be a potential therapeutic strategy of DM[12].

In this study, the prevalence of subclinical hypothyroidism is more in T2DM people. This is in association to the study of Elghazer G et al[9] and Alsolami AA et al[13] who concluded greater prevalence of thyroid troubles among patients suffering from T2 DM. And this dysfunction has been revealed as, in direct proportion with HbA1c levels. This might propose that the deprived glycemic mechanism can possibly have a part in the expansion to thyroid dysfunctions in the patients suffering from T2DM. Subclinical hypothyroidism has been found to be utmost prevalent kind of thyroid disorders in DM patients[9]. Hypothyroidism is a recognized risk feature for developing coronary artery disease (CAD) and is observed to be related with augmented all-cause mortality independent of CAD risk elements. T2DM patients were commonly seen to be at augmented risk of emerging hypothyroidism. Adequate management and control of T2DM might lessen the risk of emerging hypothyroidism[13]. According to a research study, prevalence of subclinical hypothyroidism and overt hypothyroidism was 23/100 (23%) and 3/100 (3%), respectively[14].

Tiwari et al also revealed that Subclinical hypothyroidism and overt hypothyroidism was the most common thyroid abnormality in Type 2 DM. Thyroid dysfunction was associated with worsening dyslipidemia in T2DM. The mean body mass index was high in diabetic patients with thyroid dysfunction. The hemoglobin A1c levels in patients who had thyroid dysfunction were high[15]. Different research studies revealed that hypothyroidism, particularly subclinical variety, is seen in type 2 diabetic patients. Therefore, routine screening is advised[16,18], but one study conducted at South India revealed that thyroid function profile is not altered among the T2DM patients when compared to nondiabetics[17].

Conferring to this research study, the occurrence of subclinical hypothyroidism observed to be advanced and prevalent among female T2 DM patients in comparison with general apparently healthy population. This innovation is consistent with the research by different authors i.e., Lal et al[18] and Mishra et al [19] revealed greater pervasiveness of thyroid dysfunctions among females having DM. Among hypothyroid individuals, 23.08 percent and 10 percent were male and females respectively, with noteworthy variance (p=0.017), however among these hypothyroid people, 4 %observed to be suffering from clinical hypothyroidism while 9 % cases of subclinical hypothyroidism detected[18]. So, its beneficial to screen T2DM patients for thyroid issues and this could make progress in early case detection as well as timely management, indirectly leading to improved thyroid related outcomes with the prevention of the DM complications.

CONCLUSION

It has been concluded from this research study that T2DM is one of the risk factors for thyroid dysfunctions and guidelines should be made to diagnose and manage such co morbid cases timely.

Ethical permission: Liaquat University of Medical & Health Sciences ERC letter No. LUMHS/REC/=374, dated 13-08-2015.

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AUTHOR CONTRIBUTIONS

Bai K: Concept, data collection & statistics
Abbassi A: Critical revision & suggestion
Suther RK: Data collection & literature search
Qasmi R: Critical revision & suggestion
Bhatti U: Data analysis
Rani K: Data collection

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