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THE PREVALENCE OF HYPOTHYROIDISM AMONG PATIENT WITH TYPE TWO DIABETES MELLITUS IN SECURITY FORCES HOSPITAL RIYADH: RETROSPECTIVE STUDY

Medicine

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ABSTRACT

BACKGROUND: Thyroid diseases and diabetes mellitus are the two most common endocrine disorders encountered in clinical practice. Hyper- and hypothyroidism have been associated with insulin resistance, which has been reported to be the major cause of impaired glucose metabolism in type II DM.

OBJECTIVE: The main aim of this study to investigate the prevalence of Hypothyroidism among patient with type two diabetes mellitus in security forces hospital, Riyadh.

METHODS: A retrospective cross-sectional study was done on patients who diagnosed with type II DM and regularly attended the diabetic center care at security forces hospital, Riyadh, Saudi Arabia.

RESULTS: Out of 300 randomly selected type 2 diabetic patients with hypothyroidism; 82% have TSH level ranged between 0.5 to 5.0 µIU/dl (group 1) and 13% have TSH level > 5.0 µIU/dl (group 2). In addition, there was a statistically significant association between HbA1C level and type of treatment received by our population but fasting blood glucose level was not significant. Regarding the TSH level, out of 300 patients; 9.5% were diagnosed normal and 90.5% were diagnosed abnormal regarding to the TSH level.

CONCLUSION: In our population, the prevalence of female diabetic patients with hypothyroidism was 1.8 times higher than diabetic male. The prevalence of abnormal diagnosed level of TSH was 9.5 times higher than normal level.

KEYWORDS

Diabetes mellitus, Hypothyroidism, Fasting blood glucose

INTRODUCTION

Diabetic patients have higher prevalence of thyroid disorder when compared with the normal population, with hypothyroidism being the most common disorder[16]. Diabetes mellitus and thyroid diseases are the two common endocrinal diseases. On one hand, thyroid hormones have some role in the regulation of pancreatic function and carbohydrate metabolism, and on the other hand, diabetes affects thyroid function tests to some variable extents. Both insulin and thyroid hormones being closely engaged in cellular metabolism, abnormal serum levels of either of these hormones affect the functioning of other hormone. The aim of this study is to investigate the prevalence of Hypothyroidism in patients with type 2 diabetes mellitus in clinical routine.

METHODS

This was a retrospective cross sectional study carried out on 300 diabetic patients visited the diabetic center care at security forces hospital, Riyadh, Saudi Arabia between 5th February and 30th March 2017. They were selected randomly according to the inclusion criteria (adult Saudi male and female, patient with diagnosed type II diabetes mellitus and patient age ≥ 30 years) and exclusion criteria (patients had previously thyroid surgery, pregnant women, patients with type 1 diabetes and pediatric patients) by accessing to management report viewer records through information technology department at Security Forces Hospital. Our study included many variables such age, gender, body mass index, duration of diabetes mellitus and hypothyroidism, type of therapy, compliance and chronic diseases. The data were collected in a specially designed data sheet; and entered in a computer, and finally analyzed using SPSS version 21 program.

RESULTS

Our patients were divided into two groups according to the level of TSH; the first group TSH level ranged between 0.5 to 5.0 (mIU/dl), this group contained 254 (84.6%) patients, while the level of the second group was > 5.0 (mIU/dl), this group contained 46 (15.4%). The correlation between TSH level in type 2 diabetic patients with age, gender, treatment BMI, HbA1C, past history of chronic diseases and levels of biochemical parameters (FBG, Cholesterol, HDL, LDL, TSH and T4) in the last visit. Our patients were divided into three categories according their ages; the patients' age ranged from 30 to 45 years, the patients' age ranged from 46 to 60 years and the patients' age more than 60 years. The age of most population (58.2%) was localized in the second category; 145 (56.9%) had TSH level ranged between 0.5 to 5.0 (mIU/dl) and 31 (66.7%) had TSH level > 5.0 (mIU/dl). The statistical analysis reported that there was no significant correlation between TSH level and different age categories (P-value=0.56). In our population, the prevalence of female diabetic patients with hypothyroidism was 1.8 times higher than diabetic male. The first group contained 159 (63%) females and 95 (37%) males, while the second group contained 33 (74.4%) females and 13 (25.6%) males. The statistical analysis reported that there was no significant correlation between TSH level and gender (P-value=0.17). Our patients received either insulin or oral anti diabetic drugs to decrease the glucose blood level. About half of them were treated using oral hyperglycemic agent. 117 (45.9%) patients of the first group received insulin while 137 (54.1%) received oral anti diabetic drugs. Among the second group 22 (51.3%) received insulin while 24 (48.7%) received oral anti diabetic drugs. The statistical analysis reported that there was no significant correlation between TSH level and type of diabetes treatment (P-value=0.75). The BMI of our patients during the last visit classified into three categories; normal, overweight and obese patients. In the first group, 27 (9.8%) were normal weight, 61 (23.6%) were overweight and 167 (66.7%) were obese. Among the second group patients 2 (2.6%) were normal weight, 8 (15.4%) were overweight and 35 (82.1%) were obese (Figure 1). As the BMI, increase the prevalence of hypothyroidism among our patients increase. There was no statistically significant correlation between our two studied groups and BMI (P-value=0.13). Regarding HbA1C level our patients were classified into four different groups; 46 patients belonged to the first category contained patients with HbA1C level < 7%; 42 (16.3%) had TSH level ranged between 0.5 to 5.0 (mIU/dl) and 4 (7.7%) had TSH level > 5.0 (mIU/dl), 86 patients belonged to the second category contained patients with HbA1C level 7-7.9 %; 76 (30.1%) had TSH level ranged between 0.5 to 5.0 (mIU/dl) and 12 (25.6%) had TSH level > 5.0 (mIU/dl), 75 patients belonged to the third category contained patients with HbA1C level 8-8.9 %; 63 (24.8%) had TSH level ranged between 0.5 to 5.0 (mIU/dl) and 12 (25.6%) had TSH level > 5.0 (mIU/dl) and 91 patients belonged to the forth category contained patients with HbA1C level > 9 %; 73 (28.9%) had TSH level ranged between 0.5 to 5.0 (mIU/dl) and 18 (41%) had TSH level > 5.0 (mIU/dl) (Figure 2). The statistical analysis reported that there was no significant correlation between our two studied groups and HbA1C level (P-value=0. 0.32). By studying the history of chronic diseases we found that, among first group patients (TSH level ranged between 0.5 to 5.0 (mIU/dl)); 121 (49.2%) were diagnosed as hypertension, 174 (70.7%) were diagnosed as dyslipidemia and 27 (11%) diagnosed as

hypothyroidism. While among second group patients (TSH level > 5.0 (mIU/dl)); 15 (38.5%) were diagnosed as hypertension, 23 (59%) were diagnosed as dyslipidemia and 12 (30.8%) diagnosed as hypothyroidism. The prevalence of dyslipidemia was higher among first group population. The statistical analysis reported that there was no significant correlation between our two studied groups and incidence of hypertension and dyslipidemia (P-value=0. 0.21, 0.14 respectively), but there was a significant correlation between level of TSH and incidence of hypothyroidism (P-value=0.001), where the prevalence of hypothyroidism was higher among the first group population. The results of biochemical parameters also was in concern were among first group patients; the blood pressure of 47 (19.1%) patients were >140/90 mmHg, Fasting blood glucose level of 167 (67.9%) was ≥ 126 mg/dl, low density lipoprotein level of 174 (70.7%) was ≥ 100 mg/dl, high density lipoprotein level of 67 (27.2%) was < 60 mg/dl, Triglyceride level of 75 (30.5%) was ≥ 150 mg/dl and Cholesterol level of 26 (10.6%) was ≥ 200 mg/dl. among the second group patients; ; the blood pressure of 11 (28.2%) patients were >140/90 mmHg, Fasting blood glucose level of 32 (82.1%) was ≥ 126 mg/dl, low density lipoprotein level of 24 (61.5%) was ≥ 100 mg/dl, high density lipoprotein level of 12 (30.8%) was < 60 mg/dl, Triglyceride level of 18 (46.2%) was ≥ 150 mg/dl and Cholesterol level of 4 (10.3%) was ≥ 200 mg/dl. Regarding to different biochemical parameters our results indicated that there was no statistically significant correlation between prevalence of blood pressure (>140/90 mmhg), FBG (≥ 126 mg/dl), LDL (≥ 100 mg/dl), HDL (< 60), Cholesterol (≥ 200 mg/dl) among our studied population and TSH level. While there was statistically significant correlation between prevalence of Triglyceride (≥ 150 mg/dl) and TSH level. (Table 1). The results of binary logistic regression analysis demonstrated that there was no significant difference between means of age and level of TSH in our studied groups (P-values=0.71), But there was significant difference between means of BMI and HbA1c l level (0.009, OR, 1.1; 95% CI, 1.02 to 1.13 and 0.004, OR, 1.3; 95% CI, 1.3 to 1.6 respectively), where means of BMI and HbA1C were higher in the second group (Table 2). There was significant correlation between HbA1C level and type of treatment received by our population (P-value= 0.001, OR, 1.5; 95% CI, 1.2 to 1.7), but mean of FBG was not significant (P-value= 0.06, OR, 1.07; 95% CI, 0.99 to 1.2) (Table 3).

TABLE 1

Item	Categories	TSH (0.5-5)		TSH (>5)		P value
		(254)	(%)	(46)	(%)	
Age	30-45	17	6.5%	3	5.1%	0.56
	46-60	145	56.9%	31	66.7%	
	60+	92	36.6%	12	28.2%	
Gender	Female	159	63%	33	74.4%	0.17
	Male	95	37%	13	25.6%	
Treatment	Insulin	117	45.9%	22	48.7%	0.75
	Oral anti diabetic	137	54.1%	24	51.3%	
BMI	Normal	27	9.8%	2	2.6%	0.13
	Overweight	61	23.6%	8	15.4%	
	Obese	167	66.7%	35	82.1%	
HbA1C level in the last visit	< 7%	42	16.3%	4	7.7%	0.32
	7-7.9 %	76	30.1%	12	25.6%	
	8-8.9 %	63	24.8%	12	25.6%	
	> 9 %	73	28.9%	18	41%	
Past history of chronic diseases						
Hypertension		121	49.2%	15	38.5%	0.21
Dyslipidemia		174	70.7%	23	59%	0.14
Hypothyroidism		27	11%	12	30.8%	0.001
Results in the last visit:						
Blood Pressure (>140/90mmhg)		47	19.1%	11	28.2%	0.2
FBG (≥ 126 mg/dl)		167	67.9%	32	82.1%	0.07
LDL (≥ 100 mg/dl)		174	70.7%	24	61.5%	0.25
HDL(< 60 mg/dl)		67	27.2%	12	30.8%	0.65
Triglyceride (≥ 150 mg/dl)		75	30.5%	18	46.2%	0.05
Cholesterol (≥ 200 mg/dl)		26	10.6%	4	10.3%	0.95

TABLE 2

Item	TSH (0.5-5)		TSH (>5)		P value	OR (95% CI)
	Mean	SD	Mean	SD		
Age	57.7	8.9	57.1	9.1	0.71	0.99 (0.96-1.03)
BMI	32.5	6.3	35.6	6.4	0.01	1.1 (1.02-1.13)
HbA1c level	8.3	1.5	9.1	2	0.005	1.3 (1.3-1.6)
Total	254		46			

TABLE 3

Item	Insulin		Only Oral		P value	OR (95% CI)
	Mean	SD	Mean	SD		
FBG (≥ 126 mg/dl)	9.1	3.1	8.5	3.2	0.06	1.07 (0.99-1.2)
HbA1c Level	8.8	1.6	8.0	1.4	0.001	1.5 (1.2-1.7)

DISCUSSION

There were many different studies which interested in studying the thyroid diseases among diabetic patients, the analysis of our results depending on classifying of our studied groups according to the TSH level while other studies had different classification concepts, some studies classified their population according to the type of diabetes mellitus others according to the type of thyroid disease and also according to if the studied patients were diabetic or not.. In our study, the higher prevalence of hypothyroidism (58.7%) was detected in the age between (46-60 years) while Khurana et al., (2016)[1] reported that, prevalence of thyroid disorders was found to be more in females, highest in the age group of > 60 years. Song et al., (2017)[2] reported that, the prevalence of hypothyroidism increased with age in both men and women, but the patterns were different. Our study reported that, regarding to the gender, the prevalence of hypothyroidism among type 2 diabetic patients was 1.8 higher in females than males. This results agreed with the following studies; Deepthi et al., (2013)[3] who reported that, among the 120 patients enrolled in the study, 26 patients were male patients (21.66%) and 94 patients were female patients (78.33%), Manjunath et al., (2013)[4] reported that, a total number of 100 patients of T2DM underwent thyroid function test, Among the 13 patients who diagnosed with subclinical hypothyroidism, 11 were female and 2 were male patients, Song et al., (2017) reported that, the total prevalence of hypothyroidism among the T2DM inpatients was 6.8% and the prevalence in females (10.8 %) was much higher than that in males (3.4 %), Ahmed, (2014)[5], reported that, The prevalence of hypothyroidism is high in individuals with type 2 diabetes mellitus. Our study found that, As the BMI increase the prevalence of hypothyroidism among our patients increase. This results agreed with Manjunath et al., (2013) who reported that, SCH patients had a mean BMI of 29.70 ± 3.77 kg/m2 whereas euthyroid patients had a mean BMI of 27.35 ± 4.36 kg/m2, the BMI was higher in SCH than euthyroid patients.

CONCLUSIONS

The prevalence of female diabetic patients with hypothyroidism was 1.8 times higher than diabetic male. The prevalence of abnormal diagnosed level of TSH was 9.5 times higher than normal level. The results of binary logistic regression analysis demonstrated that higher BMI and lower HbA1C were related to higher odds of hypothyroidism.

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