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Thyroid Disorders Among People with Type 2 Diabetes in Misan Province: Prevalence Study

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ABSTRACT

Diabetes mellitus type 2 (DMT2) with thyroid disorders are common endocrine disorders, and both of them mostly come close in any clinical practice. Hormones of the thyroid gland can influence carbohydrate metabolism. On the other side, there is a degree of insulin resistance in DMT2. The study aimed is to determine the prevalence of thyroid dysfunctions in DMT2. A cross-sectional study was done enrolling 100 participants included, (n= 40) men, and (n= 60) women, their age ranged between 20-90 years old. Evaluation for thyroid status and assessment of T3, T4, and TSH levels were done. The results were 60% euthyroid, 33% hypothyroid, and 7% hyperthyroid cases from 100 patients with diabetes mellitus; among them, 17% in young adults, 49% in middle age, and 34% in the old age patients, the diabetic patients' results comprised between both sexes were 40% male and 60% females. In a comparison between rural and urban patients, the results were 44% rural and 56% urban. The study found there's 22% of thyroid dysfunction patients were with family history, and 42% of DM patients with family history, besides, there is 28% of patients suffered from hypertension and 33% of patients were smokers. So, the study showed a high prevalence of dysfunction among those with DMT2, especially hypothyroidism. Family history and DM might be pre-existing factors to the development of thyroid dysfunction. Hypertension and tobacco smoking might be a risk factor for thyroid dysfunction.

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INTRODUCTION

The two most common endocrinopathies encountered in clinical practice are diabetes mellitus (DM) and thyroid dysfunction (TD) (Sarode *et al.*, 2017), and the relation between them was first published in 1979 (Vikhe *et al.*, 2013). Thyroid dysfunction manifest as hyperthyroidism or hypothyroidism (Ahmed *et al.*, 2017). The metabolic process of normal growth and development regulated by thyroid hormones (Silva *et al.*, 2017). DM is accompanied by chronic hyperglycemia and associated with carbohydrate, lipid, and protein metabolism disturbances (Ahmed *et al.*, 2017). The prevalence of TD in diabetic patients is significantly higher than in healthy people (Manjunath *et al.*, 2013). There are many records that, show that iodothyronines are insulin antagonist with elevated levels being diabetogenic while absence might inhibit the development of DM (Uppal *et al.*, 2013).

MATERIALS AND METHODS

Study design and setting

A cross-sectional observational study conducted to determined the prevalence of TD in adult patients (aged 20-90 years) with DMT2, attending the outpatient's clinic at the Diabetes and Endocrinology Center at Misan, during 2017-2018.

Participants

A total of 100 DM participants, included, 40men and 60 women. A complete history was taken, and clinical examination and laboratory investigations were done.

Inclusion criteria

1. Individuals with DMT2 were treated with oral hypoglycemic drugs
2. Those received insulin in addition to oral therapy.

Exclusion criteria

1. Those refused including in the study.
2. Uncontrol DM.
3. Uncomfortable patients.

Procedure

All patients were evaluated for thyroid status, and assessment of T3, T4 and TSH levels.

Normal values

1. T3 (0.9-2.3 nmol/l)
2. T4 (60-120 nmol/l)
3. TSH (0.25- 5.0 uUI/ml)

RESULTS

Of 100 DMT2 studied, 60 (60%) were found to have euthyroid, 7 (7%) hyperthyroid and the hypothyroid subjects were 33 (33%), presented in Table 1.

Table 2 showed the relation between the TD and age stages of DMT2 patients. The results showed that the younger age group was 17% (10% Euthyroid, 2% Hyperthyroid, and 5% Hypothyroid), whereas in the middle age, the results were 49% (30% Euthyroid, 3% Hyperthyroid, and 16% Hypothyroid). In the elderly, we found 34% (20% Euthyroid, 2% Hyperthyroid, 12% Hypothyroid).

In Table 3, we compared the female and male patients depending on the functional status of the thyroid gland, wherein male. It was: 26% Euthyroid, 3% Hyperthyroid, and 11% Hypothyroid. Whereas in female, it was 34% Euthyroid, 4% Hyperthyroid, and 22% Hypothyroid.

In Table 4, the results explained the distribution of cases based on the residential area where 44% in the rural areas (26% euthyroid, 3% hyperthyroid, 15% hypothyroid), and 56% in the urban regions (34% euthyroid, 4% hyperthyroid, 18% hypothyroid).

Table 5 shows the percentages of cases with a family history of thyroid disorders, 22% (5% Euthyroid, 3% Hyperthyroid, 14% Hypothyroid), while those with a family history were 42% (23% Euthyroid, 3% Hyperthyroid, 16% Hypothyroid).

Table 6 showed 28% of participants with hypertension (17% euthyroid, 2% hyperthyroid, 9% hypothyroid). 33% of cases were smoker (23% euthyroid, 2% hyperthyroid, 8% hypothyroid).

DISCUSSIONS

The TD had been reported to be highly prevalent in DMT2, and both hypothyroidism and hyperthyroidism are known to have adverse effects on glycaemic control (Petry, 2002). Our study entails screening for biochemical evidence of thyroid disorders in DMT2. The findings from the results were 40% thyroid dysfunctions (33% hypothyroid and 7% hyperthyroid), and this is consistence with previous similar studies performed by Telwanietal., Sarodeetal., where their results were 29%, 31.2 %, 32.4% respectively, in addition to the study of Sarodeetal found 29% patients were detected with thyroid disorders (22% hypothyroid and 7% hyperthyroid) (Telwani *et al.*, 2017; Sarode *et al.*, 2017). In Nigeria, there was a study had shown a high incidence reached to 46.5% (Udiong *et al.*, 2007). The cause may be due to the fact of the DMT2 results from insulin resistance (Wang, 2013). Sometimes, the abnormality of thyroid hormones level associate with insulin resistance, lead to decline conversion of T4 to active T3, also decline hypothalamus thyrotropin-releasing hormone (TRH) in DM (Ahmed *et al.*, 2017).

The results appeared that prevalence of DMT2 increased with older age group. These result agreed with studies of Gesing and Barbesino (Gesing, 2015; Barbesino, 2019). The ageing process decreases insulin sensitivity and alteration compensation of beta-cell function in the face of increasing insulin resistance (Chang and Halter, 2003). This decrement in beta cell proliferation capacity enhanced sensitivity to apoptosis (Maedler *et al.*, 2006).

Noh et al. showed the initial and second phase of insulin secretion typically that which decrease at the

Table 1: Incidence of TD among DMT2.

TD	%
Euthyroid	60
Hyperthyroid	7
Hypothyroid	33

Table 2: Relation between the age and thyroid disorders in DMT2.

TD	Euthyroid	Hyperthyroid	Hypothyroid	Total
Age			**%**	
Young adult (18-35)	10	2	5	17
Middle age(36-55)	30	3	16	49
Old age> 55	20	2	12	34
Total	60	7	33	100

Table 3: Relation between sex and thyroid disorders in DMT2.

TD	Euthyroid	Hyperthyroid	Hypothyroid	Total
Sex		**%**		
Male	26	3	11	40
Female	34	4	22	60
Total	60	7	33	100

Table 4: Relation between the address and thyroid disorders in DMT2.

TD	Euthyroid	Hyperthyroid	Hypothyroid	Total
Address			**%**	
Rural	26	3	15	44
Urban	34	4	18	56
Total	60	7	33	100

Table 5: Relation between family history and thyroid disorders in DMT2.

TD	Euthyroid	Hyperthyroid	Hypothyroid	Total
Family history			**%**	
With thyroid dysfunction	5	3	14	22
With DMT2	23	3	16	42
Total	28	6	30	64

Table 6: Relation between the risk factors and TD in DMT2.

TD	Euthyroid	Hyperthyroid	Hypothyroid	Total
Risk factors			**%**	
Hypertension	17	2	9	28
smoking	23	2	8	33

rate of approximately 0.7% per year with the ageing process (Noh *et al.*, 2018).

In comparison between female and male depending on the functional status of the thyroid gland, the results were in male less than female. These results agreed with studies of Khuranaetal and Ding (Khurana *et al.*, 2016; Ding *et al.*, 2017). That woman have a higher incidence of TD than men (Meng *et al.*, 2015).

For the residential area, randomly selected cases of DMT2, which were 44% in the rural area and 56% in the urban area, the results were elevated of thyroid disorders in urban more than rural people. This result was agreed with Aungetal (Aung *et al.*, 2018). The cause of DMT2 was higher in the more deprived areas relative to the more affluent areas (Connolly, 2000). In the study of Santos et al. described the socio-demographic variables, he found that the elderly individuals residing in the urban area displayed a more significant number of verified comorbidities. The old aged group DM is living in rural sites have better health (Santos *et al.*, 2013).

The study of Dudzińskaetal found differences between groups depending on the place of living, and this did not have a significant influence on the DM metabolic control. Moreover, these data are consistence with the previous study conducted by Childs (Dudzinska *et al.*, 2013; Childs, 2016).

The results appeared that there's 42% family history of DM, and this result agreed with many other studies such as Arslanian and Saad, Valdez and Liu (Arslanian *et al.*, 2005; Valdez *et al.*, 1999).

In case of risk factors, the results discovered 28% known facts of hypertension which correspond to other studies such as Saito and Saruta; and 33% smokers as a risk factor for both T2DM and TD, as the previous study of Chang, Maddatuetal, they found that tobacco smoking, related with a variety disorder of endocrine systems (Chang, 2012; Maddatu *et al.*, 2017).

CONCLUSIONS

TD has a higher prevalence in DMT2, and more in women. Hypothyroidism was the most common disorder. Family history and DM might be pre-existing factors to develop thyroid dysfunction. Hypertension and tobacco smoking might be a risk factor for thyroid dysfunction.

Conflict of interest

The authors declare that they have no conflict of interest

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