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Prevalence of Thyroid Disorders in Diabetic Patients in Tarhuna area.

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ABSTRACT

Background: Diabetes is a common disease that has complications affect most parts of the body. Some diabetics around the world, especially type II, suffer from thyroid disorders (disorders are hypothyroidism and hyperthyroidism), which is the most common endocrine disease in adults. The prevalence of thyroid diseases seems to rise with age in diabetics. Objective: This study aimed to evaluate the prevalence of thyroid disorders in diabetics in Tarhuna area. Material and Methods: Data were collected from 200 diabetics in Tarhuna region from November 2022 to March 2023 using a questionnaire and performing of the following tests, TSH and FSB. Results: According to the study's results, 54% of cases suffer from diabetes type I, while 46% suffer from diabetes type II. The study showed that 38.5% of cases suffered from thyroid disorders (15.5% hyperthyroidism and 23% hypothyroidism). While 61.5% do not suffer from any thyroid disorders that 14.50% of cases were suffer from thyroid disorder before the development of diabetes, while 24% have developed thyroid disorders after occurrence of diabetes. Conclusion: It has been found that, thyroid disorders were common in patients with diabetes. It was also showed that cases of hypothyroidism and hyperthyroidism occur in females at a greater rate than males, whether before or after diabetes, but the incidence of thyroid disorders in females was more after onset of diabetes.

1. INTRODUCTION

Thyroid disorder is one of most common endocrine disorder in the general population and particularly in diabetics and the elderly, these disorders are hypothyroidism and hyperthyroidism, hypothyroidism is common in adults, especially in women as they progress in the age. Originally, it has been considered as an autoimmune disease presenting as either Hashimoto's thyroiditis or primary atrophic hypothyroidism **[Islam et al, 2008]**.

Diabetes is a common disease that has complications affect most parts of the body, including the retina, kidneys, and other side effects. Thyroid hormone has an effective value in regulating metabolism and energy production, but thyroid disease often coexists with diabetes. In the early literatures, the influence of thyroid hormone excess in the deterioration of glucose control was coined as thyroid diabetes, and for almost many previous studies concentrated on the relationship between diabetes and thyroid disease **[Nishi 2018]**. The effect of thyroid dysfunction on glucose metabolism in normal and diabetic level has been evaluated in detail **[Brenta 2010]**. The thyroid disorder is experienced in both types I and II diabetes. Individuals with autoimmune-related type I diabetes may have associated with thyroid disease **[Islam et al, 2008]**.

Type II diabetes mellitus is most commonly current metabolic disorder, as it affects more than 385 million and it may reach almost 590 million by 2035 worldwide. It is usually associated with dyslipidemia, which compound the risk of cardiovascular disease. The prevalence rate of thyroid dysfunction is much higher among diabetic population and estimated to be from 6.90% to 16%. While other- related diabetes mellitus such as sinus tachycardia, atrial flutter and atrial fibrillation are commonly found in patients suffering from overt or subclinical hyperthyroidism **[Jiffri 2017]**.
Unbalanced of thyroid hormones as a result untreated thyroid dysfunction has an effect on glucose metabolism via several mechanisms which has long been recognized to induce hyperglycemia. During hyperthyroidism, the metabolic regulation of glucose may be effect as a result of reduced C-peptide to pro insulin ratio, this suggest an underlying defect in pro insulin processing. Because of Insulin resistance, it may increase thyroid gland nodularity and coexisting diabetes. **[Hage et al, 2011]**.
Aim of study: This study aimed to assess the prevalence of thyroid disorders among type I and II diabetic patients in Tarhuna region, as well as to determine the relationship between diabetes and thyroid disorders

2. METHOD

Study area and population: This study was conducted on 200 diabetic patients at Tarhuna region (97 males and 103 females) from November 2022 to March 2023.
Data collection: Data have been collected by conducting laboratory analyzes to find the level of fasting blood sugar (FBS) using spectrophotometer, and thyroid stimulating hormone (TSH) using the Finecare device for each of volunteers **[RIELE. Photometer 4040 v5+; Finecare TSH]**, and a questionnaire was designed in Arabic and was answered by all respondents to obtain the important data about each case.
- **Normal values** (fasting blood sugar: 70-120 mg/dl **[Biolab diagnostic (I) PVT]**, and TSH; 0.3-4.2 IU/ml **[Finecare TSH]**.
Data analysis: The obtained data were presented in tables and forms and then discussed to obtain valid and reliable results.

3. RESULT

According to figure 1, this study involved 200 diabetic individuals from the Tarhuna district, 97 of them (48.50%) were male and 103 of whom (51.50%) were female, further, table 1 and Figure 2 show that 92 (46%) of the total cases had type I diabetes (45 males and 47 females), and 108 (54%) suffer from type II diabetes (52 males and 56 females).

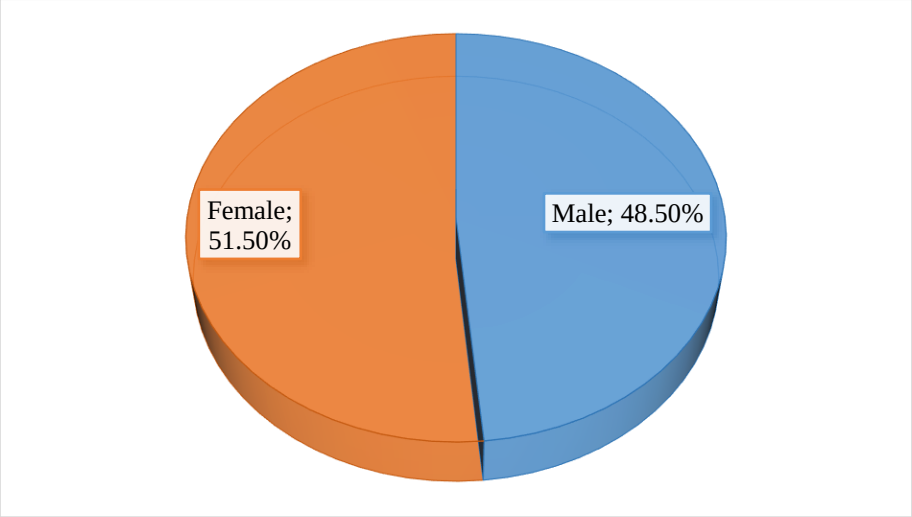

Figure 1- distribution of study sample according to gender.

Table 1-The incidence of diabetes according to the type I and type II

Diabetes type	Type I			Type II		
Gender	Male	Female	**Total**	Male	Female	**total**
Number	45	47	**92**	52	56	**108**
Percentage	48.91%	51.09%	**46%**	48.15%	51.85%	**54%**

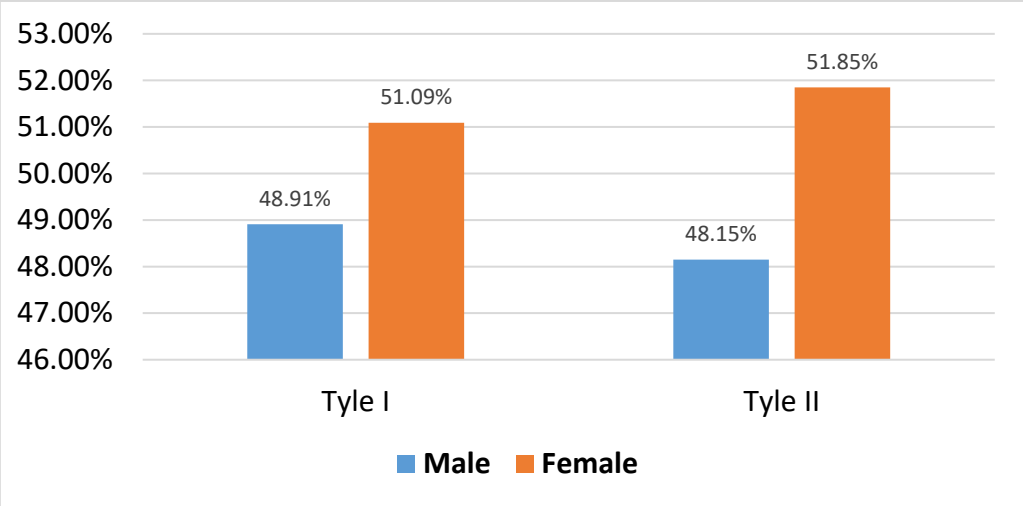

Figure 2-The incidence of diabetes types according to gender

It has been from table 2 and figure 3 that majority of type I diabetes cases were between the ages of 21 - 35 with a rate of 13.50%, followed by cases between the ages of 36 to 50 years with a percentage of 10.50%, then those with ages of 6 - 20 years at 7.50%, while the percentage of whose ages 66 - 80 years was 6.50%, followed by those of 51 to 65 years at 5.50%, and finally those over the age of 80 years with a rate of 2.50%. While the age group of 51 - 65 years was the most common among people with type II at a rate of 23%, followed by the ages from 36 to 50 years (15%), then ages from 66 to 80 years at a rate of 12%. However, the percentage decreased in the age group from 21 to 35 years to 2.50%, and also at the ages of 6 to 20 years it reached 1%, and finally the cases over 80 years old were 0.50%.

Table 2-The incidence of diabetes according to age.

Diabetes type	Type I			Type II		
Age and Gender	Male	Female	Total	Male	Female	total
6 to 20 y	7	8	15(7.50%)	1	1	2(1%)
21 to 35 y	14	13	27(13.50%)	2	3	5(2.50%)
36 to 50 y	10	11	21(10.50%)	12	18	30(15%)
51to 65 y	4	7	11(5.50%)	24	22	46(23%)
66 to 80 y	6	7	13(6.50%)	12	12	24(12%)
More than 80 y	4	1	5(2.50%)	1	-	1(0.50%)
Total	45	47	92(46%)	52	56	108(54%)

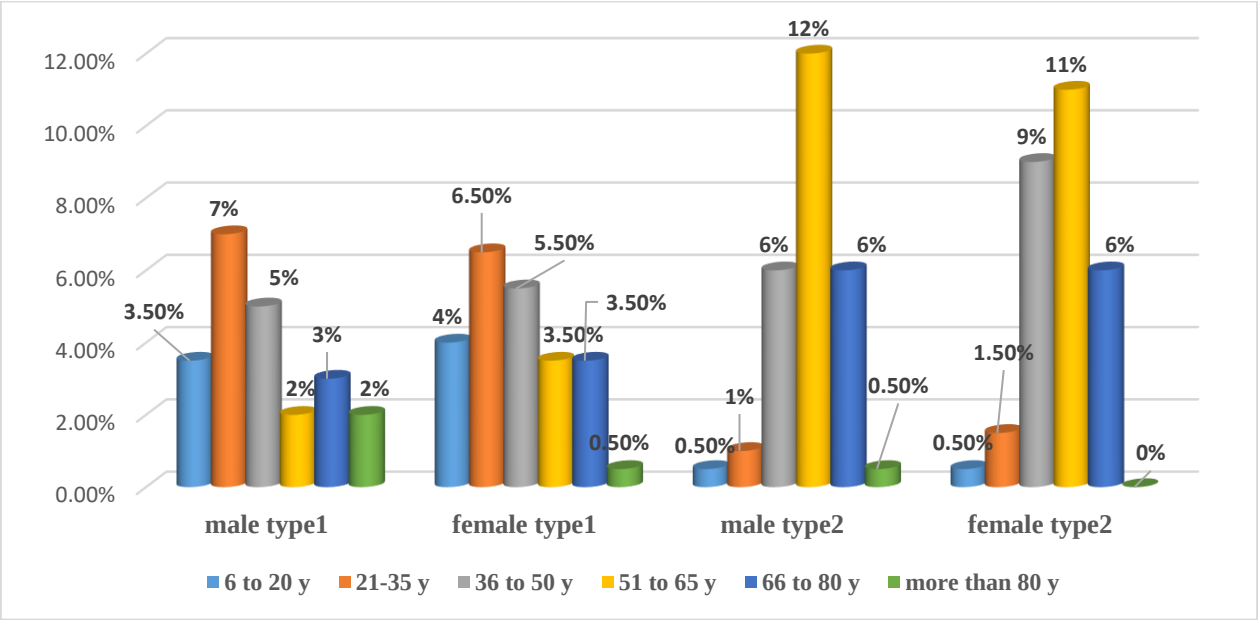

Figure 3-The incidence of diabetes according to age.

Table 3 shows that out of all cases, 31(15.5%) suffer from hyperthyroidism, including 9(4.5%) of males and 22 (11%) of females, while 46(23%) suffer from hypothyroidism, including 16(8%) of males and 30(15%) of females, on the other hand, 123(61.50%) cases do not have any thyroid disorders, including 72(36%) males and 51(25.50%) females.

Table 3- Prevalence of thyroid disorders according to gender

Gender	Disorders type			Total
	Hyperthyroidism	Hypothyroidism	No- disorders of thyroid disorders	
Male	9(4.50%)	16(8%)	72(36%)	97(48.50%)
Female	22(11%)	30(15%)	51(25.50%)	103(51.50%)
Total	31(15.50%)	46(23%)	123(61.50%)	200(100%)

According to the findings of the current study it became clear that 29 cases 14.50% were suffering from thyroid disorder before the development of diabetes, including 11(5.50%) males and 18(9%) females, while 48 cases 24% have developed thyroid disorders after occurrence of diabetes, among of them, 14(7%) males and 34(17%) females. Conversely, there are 123 cases 61.50% which did not suffer from a thyroid gland disorders, as elucidate in table 4.

Table 4- the occurrence of thyroid disorders according to the onset of diabetes

Gender	Occurrence of thyroid disorders		No-disorders of thyroid disorders	Total
	Before onset diabetes	After onset diabetes		
Male	11(5.50%)	14(7%)	72(36%)	97
Female	18(9%)	34(17%)	51(25.50%)	103
Total	29(14.50%)	48(24%)	123(61.50%)	200

As in table 5, it was found that among the cases of hyperthyroidism, there was 16(8%) suffer from type I diabetes (6 males and 10 females), while 15(7.50%) suffer from type II diabetes (3 males 12 females).
In particular, according to the ages of the cases of hyperthyroidism accompanied with type I diabetes, 3.50% of them ranged from 36 to 50 years old, and the percentage of those whose ages ranged from 66 to 80 years was 1.50%, as for the cases that ranged from 6 to 20 years, from 21 to 35 years, and from 51 to 65 years, have the same percentage 1%.
On the other hand,

The percentage of cases that suffer from hyperthyroidism with type II diabetes reached 3% among those between the ages of 51 - 65 years, while the cases at the ages of 36 - 50 years, and 66 - 80 years, represent same percentage (2%), and the percentage of cases between the ages of 21 and 35 years was 0.5%.

Table 5 - The incidence of hyperthyroidism among diabetics (type I and type II).

Age and Gender	Diabetes type					
	Type 1			Type 2		
	Male	Female	Total	Male	Female	total
6 to 20 y	-	2	2(1%)	-	-	-
21 to 35 y	1	1	2(1%)	-	1	1(0.50%)
36 to 50 y	3	4	7(3.50%)	-	4	4(2%)
51to 65 y	1	1	2(1%)	2	4	6(3%)
66 to 80 y	1	2	3(1.50%)	1	3	4(2%)
More than 80 y	-	-	-	-	-	-
Total	6	10	16(8%)	3	12	15(7.50%)

The results of this study obvious that, among hypothyroidism cases, 19 (9.50%) were suffered from type I diabetes (8 males and 11 females), whereas 27 (13.50%) suffered from type II diabetes (8 males and 19 females).
On the basis of age, the highest rate (3%) of cases of hypothyroidism accompanied with diabetes mellitus type was among those between the ages of 21 and 35 years, followed by the age group from 36 to 50 years (2.50%), and (1.50%) for each of the following ages (51-65 years) and (66-80 years), while the percentage of ages (6-20) and (more than 80 years) was 0.50% each.
In the same context, the percentage of people suffering from hypothyroidism with type II diabetes aged of 51 to 65 years 5.50%, while the percentage of cases aged 36 to 50 years was 4%, and cases of 66 - 80 years was 3.50%, while the cases, whose age ranged from 21 to 35 years, amounted to 0.50%, as describe in table 6.

Table 6 - The incidence of hypothyroidism among diabetics (type I and type II).

Age and Gender	Diabetes type					
	Type 1			Type 2		
	Male	Female	Total	Male	Female	Total
6 to 20 y	-	1	1(0.50%)	-	-	-
21 to 35 y	2	4	6(3%)	-	1	1(0.50%)
36 to 50 y	3	2	5(2.50%)	1	7	8(4%)
51to 65 y	-	3	3(1.50%)	5	6	11(5.50%)
66 to 80 y	3	-	3(1.50%)	2	5	7(3.50%)
More than 80 y	-	1	1(0.50%)	-	-	-
Total	8	11	19(9.50%)	8	19	27(13.50%)

4. DISCUSSION

This study investigated the prevalence of thyroid disorders in diabetic patients in the Tarhuna region in western Libya. Results showed that the number of people with type II diabetes is greater than the number of people with type I diabetes, that the type II counted 108 out of 200 cases (females more than males). This is in agreement with a study in Italy by Ciarambino et al, 2022. The majority of type II diabetic patients are at the ages of 51 - 65 years, while the majority of type I were found in the ages of 21 to 35 years.

Through the results of this study, the total number of diabetic patients suffering from a thyroid disorder was 77 (more than a third) 31 of them suffer from hyperthyroidism, and 46 suffer from hypothyroidism, this means that hypothyroidism was the most prevalent thyroid disorder in diabetic patients take place in current study (especially in females with type II diabetes).

These findings appear to be in accordance with a study by [Bukhari et al, 2022] in Pakistan, [Elmenshawi et al, 2017] in Al-Qurayyat Governorate, Al-Jouf, and KSA., and with the literature review by [Duntas et al, 2011].
Patients who suffered from thyroid disorders after developing diabetes were greater than who had thyroid disorders before developing diabetes (24% & 14.50%), respectively.
The most age group that suffered from hyperthyroidism was from 36 to 50 years for type I diabetes, and 51 to 65 for type II diabetes.

5. CONCLUSION

According to the results of this study, females with diabetes in Tarhuna area are more likely to be diagnosed with type II than type I.
Also, it was found that there are thyroid gland disorders accompanied to diabetes particularly hypothyroidism, in which the largest rate was in patients with type II diabetes especially among females, the largest percentage was between the ages of 36 to 80 years.
While hyperthyroidism was present in close proportions among diabetics, whether of the type I or the type II, although the type I had the most rate in hyperthyroidism, especially between the ages of 36 to 50 years, which represented 3.5% for both gender.
Through the questionnaire, it was found that the incidence of hypo- and hyperthyroidism disorders occurred in females at a rate greater than that of males, whether before or after the occurrence of diabetes, however, the incidence of thyroid disorders in females was more after the incidence of diabetes.

6. RECOMMENDATIONS AND FURTHER WORK

1- Thyroid hormone levels recommended to evaluate in everyone (diabetic or non-diabetic) as a control.
2- Further studies are needed to learn more about the dietary practices of type I and type II patients in Libya as well as other factors that could be contributing to the thyroid disorder that these patients are experiencing.
3- More studies advised to be done on the connection between adult patients with hypothyroidism and hyperthyroidism and diabetes.

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