Original Article

Frequency of Hypothyroidism in Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Objective: To determine the frequency of hypothyroidism in patients with type 2 Diabetes Mellitus.
Study Design: Descriptive / cross sectional study
Place and Duration of Study: This study was conducted at the Department of Medicine and Endocrinology, MTI HMC/KGMC Peshawar from March 2016 to September 2016
Materials and Methods: In this descriptive cross sectional study sample size was calculated according to WHO sampling technique a total of 151 using prevalence of hypothyroidism among diabetes patients are about 17%, 95% confidence level and 6% margin of error with WHO formula. Consecutive non probability sampling technique was used to collect samples for our study.
Result: In our study mean age of patients with diabetes mellitus type 2 was 55 yr with SD ± 1.26. Forty two percent patients were male and 58% patients were female. Eighty three percent patients had euthyroidism, 5% patients had hypothyroidism overt, 12 % patients had subclinical hypothyroidism.
Conclusion: The study showed that the frequency of both subclinical and clinical hypothyroidism is significant in patients with type 2 diabetes mellitus and is one of the complications or co-finding in all such patients.
Key Words: Hypothyroidism overt, subclinical hypothyroidism, type 2 Diabetes Mellitus

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INTRODUCTION

Diabetes mellitus type 2 is metabolic disorder which is manifested by hyperglycemia, resistance go Insulin and relative deficiency of insulin. Diabetes Mellitus is the commonest endocrine disorder, leading cause of death worldwide[1]. Diabetes type 2 in enormously increasing in age group 30 to 39 years; and at the same time in children and adolescent age as well [2]. The prevalence of diabetes mellitus in adult age (20 to 79 years) in 2010 was 6.4% affecting 285 million of the world population in 2010. The figure is estimated to be as high as 7.7% and will affect a world population of 439 million. For diabetics the situation is getting extremely alarming from 2010 to 1030 for developing countries where the increase is estimated to be 69% and for developed countries it will rise by 20 % by year 2030[3,4]. The commonest manifestations of Diabetes Mellitus are increase water intake, frequent and large amount of urination and weight loss.

Diabetics may also complain of increased hunger, easy fatigability and poor healing of the wounds [5]. Various symptoms of the diabetics manifest slowly and with the passage of time.

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Diabetes Mellitus type 2 patients can present with long term complications commonly and at times with short term complications. The incidence and prevalence has markedly increased from 1960 to 2013 and much higher is thought to be in coming decade[,6]. Type 2 DM starts most commonly in the middle age and is strongly related to obesity. The long term complications include o prolonged hyperglycemia includes heart disease, Strokes, diabetic retinopathy which can result in blindness, nephropathy and peripheral angiopathy, endocrinnopathy and neruropathy. Least commonly acute complications like hyperosmoloar coma and ketoacidosis can also result [7-10].

Thyroid hormones play a vital role in regulation of the metabolic events including protein, carbohydrate and lipid metabolism. Hypothyroidism, like obesity is one of the pathophysiological conditions which is associated with lipid metabolism disorder and can lead to dyslipidemia. Till date pathophysiology of the thyroid functions is not clear but thyroid antibodies are considered to be causing agents[11]. Thyroid problems especially hypothyroidism is quite prevalent in diabetes mellitus and has been observed from as low as 2.2% to as high as 31% and 46% respectively. If diabetes is poorly controlled it can alter plasma triiodothyronine (T3) and in part thyroxine (T4) levels. Diabetes and hypothyroidism meet each other through various common clinical characteristics[12,13]. Both are independently associated with overweight/obesity, dyslipidemia, hypertension and depression. A combination of both diabetes and hypothyroidism puts the person at higher risk of insulin resistance and cardiovascular disease. Uncontrolled hypothyroidism

may mask the clinical features of diabetes, which becomes evident only after a euthyroid state is achieved. Subclinical hypothyroidism has been the focus of interest in the past few years. The ability to diagnose and treat unsuspected hypothyroidism in these populations may greatly enhance the quality of life. Hence, the detection of such cases is of great importance where hypothyroidism contributes to morbidity and where it is the cause for poor control of the associated conditions[14].

There is limited data both about diabetes and endocrine disorders but more so about the relationship between diabetes and hypothyroidism. Hence, we tried to explore the prevalence of hypothyroid and co-relation of the both with this study and evaluated the frequency with which hypothyroidism both overt and subclinical is associated with Type 2 Diabetes mellitus in the local adult population as it is a growing problem not only in our country but globally as well and it has been observed that patients with thyroid disorders are diagnosed quite later in their life. The prevalence of hypothyroidism has not been studied in diabetic patients in our country. This study will demonstrate patients with hypothyroidism at an early age so that timely treatment may reduce morbidity and mortality associated with the occurrence of this condition.

MATERIALS AND METHODS

This study was conducted at the Department of Medicine and Endocrinology MTI HMC Peshawar. The study was cross sectional descriptive in nature and was conducted over a time period of sex months from 5/3/2016 to 5/9/2016. All patients with diabetes mellitus type 2 were included I n the study. A Sample size was 151 using prevalence of hypothyroidism among diabetes patients is about 17%, 95% confidence level and 6% margin of error with WHO formula using consecutive non-probability sampling technique. All patients with T2DM aged 35 to 60 years and of either gender, irrespective glucose control and treatment were included in the study. Patients with Type 1 Diabetes Mellitus, with Gestational diabetes, steroid induced diabetes and patients who were on medications and/or have conditions that affect thyroid function were excluded from the study.

The study was carried out with criteria fulfilling the ethical aspects of the study. All patients seen in OPD as well admitted in hospital and meeting criteria were included in the study. The consent, purpose and aim of the study was disclosed to the patients and a prefilled documented consent was obtained. Patient's demographic data was recorded on the proforma. Detailed history was taken and relevant clinical examination was done. Strict exclusion criteria were followed in order to control confounders and bias in the study results. All patients in the study was thyroids functions tests done for thyroid status and also target organ evaluation for Diabetes Mellitus, thyroid status and demography was recorded on the approved proforma.

Data was entered and assessed by SSPS version 22. Mean + SD was used to assess numerical variables like duration of type 2 DM and age. Frequencies & Percentages were calculated for categorical data including sex, thyroid status (Euthyroidism, hypothyroidism overt and subclinical) and diabetes status. Hypothyroidism was stratified among age and duration of type 2 DM and sex to look for the effect modification. Chi-square test was applied after this wholw process of stratification with p-value ≤ 0.05. Tables were used to present the results.

RESULTS

We analyzed our data on 151 patients fulfilling the inclusion criteria. Age distribution among 151 patients was analyzed as 12(8%) cases were found below45 years, 33(22%) in the age range of 46-55 years, 106(70%) subjects documented in age range 55-60 years. We found a mean age of 55 years with SD ± 1.26. We found that out of 151 patients with type 2 DM 63(42%) patients were male and 88(58%) patients were female.

In our study we documented that the number of type 2 DM was different in different age group depending upon duration of the diabetes since onset. We found that 35(23%) patients were having diagnosed diabetes from 5-10 years, 78(52%) were having type 2 DM from 11-15 years and 38 (25%) 15-20 years. The mean period was 12 years with SD ± 2.77, as in table 1

Table No. 1: Duration of diabetes (n=151)

Duration	Frequency	Percentage
5-10 years	35	23%
11-15 years	78	52%
16-20 years	38	25%
Total	151	100%

Table No.2: Thyroid status in type 2 Diabetes Mellitus (n=151)

Thyroid Status	Frequency	Percentage
Euthyroidism	125	83%
hypothyroidism overt	8	5%
Subclinical hypothyroidism	18	12%
Total	151	100%

Mean duration of diabetes was 12 years with SD ± 2.77

In our study 109(72%) patients had already confirmed diabetes while 42(28%) patients were newly diagnosed type 2 diabetics. Thyroid status among 151 patients was analyzed as 125(83%) patients had euthyroidism, 8(5%) patients had hypothyroidism overt, 18(12%) patients had subclinical hypothyroidism as given in table 2.

Stratification of thyroid status (Euthyroidism, hypothyroidism overt and subclinical) with age,

duration of type 2 DM and sex is shown in table no 3,4 and 5.

Table No. 3: Stratification of thyroid dysfunction w.r.t age distribution (n=151)

Thyroid Status		<45 years	46-55 years	56-60 years	Total	P Value
Euthyroidism	Yes	10	28	87	125	0.9330
	No	2	5	19	26	
Total		12	33	106	151	
hypothyroidism overt	Yes	1	2	5	8	0.8479
	No	11	31	101	143	
Total		12	33	106	151	
Subclinical hypothyroidism	Yes	1	4	13	18	0.9229
	No	11	29	93	133	
Total		12	33	106	151	

Table No. 4: Stratification of thyroid dysfunction w.r.t gender stribution (n=151)

Thyroid status		Male	Female	Total	P Value
Euthyroidism	Yes	53	72	125	0.7109
	No	10	16	26	
Total		63	88	151	
hypothyroidism overt	Yes	3	5	8	0.0619
	No	60	83	143	
Toatl		63	88	151	
Subclinical hypothyroidism	Yes	8	10	18	0.8028
	No	55	78	133	
Total		63	88	151	

Table No. 5: stratification of thyroid dysfunction w.r.t duration distribution (n=151)

Thyroid Status		5-10 years	11-15 years	16-20 years	Total	P Value
Euthy-roidism	Yes	29	65	31	125	0.9727
	No	6	13	7	26	
Total		35	78	38	151	
hypothy roidism overt	Yes	2	4	2	8	0.9917
	No	33	74	36	143	
Toatl		35	78	38	151	
Subclini cal hypothy roidism	Yes	4	9	5	18	0.9635
	No	31	69	33	133	
Total		35	78	38	151	

DISCUSSION

Diabetes is becoming the most alarming medical disorder and is highly prevalent in all over the world. It is sparing only that part of the world population who are avoiding bad physical and food habits; and adopting healthy life style and food habits [15]. Our study shows that among 151 patients 8% cases were having age <45 yrs, 22% cases were in 46-55 yrs, 70% cases ranged 55-60 yrs. In our study we found that the mean age was 55 yrs with Standard Deviation (SD) ± 1.26. In our study were male and 58% cases were female. About the duration of the type 2 DM, twenty three percent had diabetes from 5-10 yrs, 52% from 11-15 years, 25% patients had diabetes from 15-20 years. We found that mean period or duration of diabetes was 12 yrs with SD ± 2.77.

In this study 72% patients had diagnosed diabetes while 28% patients had newly diagnosed diabetes. Eighty three percent of the patients had euthyroidism, 5% patients had hypothyroidism overt, 12% patients had subclinical hypothyroidism. Similar results were observed by Song F [16]. He found that the total prevalence of hypothyroidism among type 2 diabetes mellitus inpatients was 6.8 % while 77.0 % of the cases had subclinical hypothyroidism. Hypothyroidism had a direct relation with the increasing age and was also found to be occurring at higher rate in female compared to male patients i.e. 10.8 % and 3.4 % in female and male. The odds ratio and 95 % confidence interval was noted for Older age, female gender and positive thyroid peroxiadase antibody. For the advanced or older age (odds ratio, 1.74; 95 % confidence interval, 1. 05 to 2.89), for the female (odds ratio, 2.02; 95 % confidence interval, 1.05 to 3.87), and in case of positive thyroid peroxidase antibody (odds ratio, 4.99; 95 % confidence interval, 2.83 to 8.79) were attributed to the higher odds of hypothyroidism among type 2 DM indoor patients. The type 2 diabetes mellitus hospitalized with hypothyroidism had higher prevalence of CVAs (cerebrovascular accidents) diseases than those with euthyroidism after adjustment for age and gender. The prevalence of hypothyroidism among type 2 diabetes mellitus inpatients was 6.8 %, and most patients had subclinical hypothyroidism. Almost the same results were documented b a study carried out by Shaikh [17] in which a total of 120 cases were studied. In this study there were two groups a diabetic one comprising of 60 cases and a similar number of normal cases in the second group. In the diabetic group 7(11.66 %) were subclinical cases with hypothyroidism and 21(35%) cases were hypothyroid. They found that in the subclinical group male predominate female making 3 (5%) and 4(6.66%) respectively while female outnumbered the male making in the clinical hypothyroid group constituting 14(23.33%) and 7(11.66%) respectively. Jali MV et al conducted study of the same nature and he found that prevalence of thyroid dysfunction in type 2 DM was 16.2%. In his study prevalence in female was 25% and 10% in male with p value of <0.001. The prevalence in age group >55 years was high constituting 19% as compared to other groups with p value=0.036 [18].

Type 2 diabetics give the features of a hyperthyroidism like marked weight loss and increase hunger in either condition. The diabetic nephropathy has a close resemblance with the hypothyroidism because of pallor, weight gain, edema and easy fatigability in either condition [19]. Another international study documented that thyroid functions are affected in type 2 DM and the frequency in this study was 6.6 %. [20]. The abnormal level of TSH has been observed in a study conducted in

type 2 DM patients and the frequency was 31% [21]. There are studies where the frequency of hypothyroidism was as high as 35 % and clinical evidence found in 11.66% cases, which is quite high as compared to our data [22].

CONCLUSION

The study showed that the frequency of both subclinical and clinical hypothyroidism is quite significant in patients with type 2 diabetes mellitus and is one of the complications or co-finding in all such patients.

Author's Contribution:

Concept & Design of Study:	Muhammad Bilal Khattak
Drafting:	Shabnam Gul
Data Analysis:	Muhammad Aqeel Khan
Revisiting Critically:	Shabnam Gul, Muhammad Aqeel Khan
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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