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Research Article

## THE HYPOTHYROIDISM FREQUENCY IN PATIENTS OF TYPE II DIABETES MELLITUS

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**Abstract:**

*Objective:* To estimate the hypothyroidism frequency in patients having type 2 diabetes mellitus.

*Study Design:* A cross sectional descriptive study.

*Place and Duration:* In the Medical wards of Holy Family and Benazir Bhutto Hospital, Rawalpindi for one year duration from March 2018 to February 2019.

*Patients and methods:* The study of one twenty individuals were included in the research, sixty healthy people as normal and sixty diagnosed type-2 diabetic patients from general population. The individuals have 5 years of disease duration and have normal blood pressure were carried for the study from different medicals wards. A short information, physical examination and clinical history were checked and kept record on proforma available for study. A proper examination was performed of each individual and scrutinized for fasting serum glucose, TSH, HbA1C, FT3, FT4 and high blood pressure. Increase in TSH level when FT4 was below normal range it causes the Hypothyroidism, If just TSH level was elevated beyond limit with normal FT3 and FT4 levels then subclinical hypothyroidism is diagnosed.

*Results:* 120 individuals were included in the study. Sixty normal individuals and sixty type 2 diabetic patients had similar age, height, weight and body mass index in both groups. In the normal human group, 33 (55%) were female, 27 (45%) were male, 31 (51.66%) and 29 (48.33%) were male in the patient population. The diabetic patient's age range form 25-60 with 45.2 years mean and in the control subjects 22-58 years with 45.1 years mean. The control group glycosylated hemoglobin 4.2 - 5.9% (mean = 5.23), fasting blood glucose level was 68 - 108 mg / dl (mean = 87.38 mg / dl) and TSH levels were 0.24-3.8 with 2.34 mIU / l mean. Type 2 fasting blood glucose in diabetic patients ranged from 125 to 212 (mean-180.82) mg / dl. Glycosylated hemoglobin was 9-11% (mean = 9.28) and TSH levels were 0.01 to 50 (mean = 17.14) mIU / l. 7 (11.66%) diabetic patients had subclinical hypothyroidism and hypothyroidism noted in 21 (35%) patients.

*Conclusion:* The common disorders in all populations are diabetes mellitus and Hypothyroidism. In the diabetic population, hypothyroidism frequency is more than in normal population. In our population, the observed frequency is greater.

**Key Words:** Thyroid, Diabetes Mellitus, Subclinical hypothyroid.

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**INTRODUCTION:**

Basic unit of thyroid are follicles (Acini), which functions in the absorption of Iodine from blood for thyroid hormone production. I.e. Thyroxine (T4) and Triiodothyronine (T3). The persons who use Iodized salt permanently in their diet have higher concentration of T4 and T3 which is sometime the cause of clinical/ subclinical hyperthyroidism, that's why high observation on salt users for thyroid hormone level is advised<sup>1</sup>. Diabetes mellitus and Thyroid dysfunction are more often the cause of endocrine system diseases seen in general population<sup>2</sup>. In common population thyroid misbalance is calculated to be 6.6%, about 10.8% of frequency was calculated in diabetic people<sup>3</sup>. The frequency of clinical hypothyroidism is 4.1% & sub clinical hypothyroidism is 5.4% while the clinical hyperthyroidism frequency is 5.1% and 5.8% sub clinical hyperthyroidism noted in our population<sup>4</sup>.

For brain development thyroid hormone is essential element. An increased level of TSH in child bearing age which represents the thyroid hormone deficiency<sup>4</sup>. After the pregnancy is diagnosed TSH should be regularly checked. The accumulation of glycosaminoglycan and hyaluronic acid in the interstitial tissues cause the symphonic change in hypothyroid patients. Thyroid hormone dysfunction in a woman causes infertility, menstrual abnormalities and increased morbidity in child bearing age. Hypothyroidism may cause the renal dysfunction in a diabetic patient<sup>5</sup>. Increase in serum iodine level plays a vital role in development of primary hypothyroidism, than an autoimmune mechanism or extra vascular hormone loss. Clinical examination of diabetic patient is difficult for the diagnosis of thyroid dysfunction, because hyperthyroid features are similar to poor glycemic control, like fatigue on frequency of Hypothyroidism in type II diabetic patients and weight loss in spite of increased appetite<sup>6</sup>. Moreover in diabetic renal failure the patient has hypothyroidism because it indicates pallor, fatigue, edema, and weight gain. Patient with coronary artery infection is highly pervasive to hypothyroidism and is related with a few cardiovascular risks<sup>7</sup>. The early screening in diabetic people is needed for hypothyroidism and hyperthyroidism; because there is notable difference in pervasiveness of thyroid issue in diabetic and normal people. Hyperglycemia occurs because of total or relative insufficiency of insulin, as diabetes mellitus is a group of metabolic disorders which weakens the activity of insulin or both. Type-2 diabetes mellitus is heterogeneous, multifactorial result of abnormalities caused by insulin resistance/relative insulin inadequacy/insulin receptors<sup>8</sup>. An anti-inflammatory substance blocks the apoptosis of  $\beta$  cell in type II

diabetes mellitus and this could be beneficial in new advancement for type-2 diabetes. Globally the prevalence of diabetes for all age groups in 2000 was 2.8% and it reaches to 4.4% in 2030<sup>9</sup>. People with Diabetes Mellitus are predicted to rise from 171 million to 360 million in 2000 to 2030. General population also contains the thyroid disease in common. In the whole population 6.6% of adults were affected by thyroid dysfunction found by Whickham survey<sup>10</sup>. Abnormal TSH (31%) was high in type II diabetic patients reported by Celani *et al*. Patients might be on thyroid risk when TSH level is underneath upper normal however the antibodies might be in normal limits. On this reason present study was carried out on type-2 diabetic patient to assess the frequency of hypothyroidism.

**MATERIALS AND METHODS:**

This cross-sectional descriptive study was held in the Medical wards of Holy Family and Benazir Bhutto Hospital, Rawalpindi for one year duration from March 2018 to February 2019.

For this research one twenty people were studied, from which sixty were healthy people as normal, having no history of diabetes and sixty diagnosed type-II diabetic patients. The individuals have 5 years of disease record and normal blood pressure been selected from different medical wards.

The consent was obtained from each individual and nature of study was explained to them. The Patients which have renal disease, type1 diabetes mellitus, pregnant ladies liver disease, sick patients with chronic diabetes and those who are suffering from thyroid dysfunction were eliminated from study. A short information, physical examination and clinical history were checked and kept record on proforma for the study. A proper examination of each individual was performed and scrutinized for fasting serum glucose, blood pressure, FT3, FT4, HbA1C and TSH. An overnight fast of about 8-10 hours were kept by the individuals and Blood samples were collected from the diabetic patients and also from normal individuals and used for calculation of thyroid hormone levels (TSH, FT3, FT4), glycated hemoglobin and fasting serum glucose. If TSH level was high than the normal range with FT3 and FT4 normal levels then subclinical hypothyroidism was diagnosed and if TSH level is more than FT4 was below normal range then hypothyroidism was labelled.

**RESULTS:**

120 total individuals were included in this study. 60 normal individuals and 60 type 2 diabetic patients had similar age, height, weight and body mass index in both groups. In the normal human group, 33 (55%) were female, 27 (45%) were male, 31 (51.66%) and 29 (48.33%) were male in the patient population. The main characters of both groups are shown in Table 1.

Table -1: Basic characteristics of control subjects and diabetic patients.

Characteristic	Control subject	Diabetic Pts.
Mean age	45.25 years	45.1 years
Mean height	163.11 cms.	159.24 cms
Mean weight	67.33 kgs	50.79 kgs
Mean BMI	25.20 kg/m <sup>2</sup>	20.15 kg/m <sup>2</sup>

25-60 was the age range of diabetic patients with 45.2 years of age mean and 22-58 (mean = 45.1) in the control group. 68-108 mg / dl (mean = 87. 38mg / dl) was the control group fasting blood glucose level, 4.2-5.9% (mean = 5.23) was glycosylated hemoglobin and 0.24-3.8 (mean = 2.34) mIU / l was the TSH levels. In type 2 diabetic patients fasting blood glucose range from 125-212 (mean-180.82) mg / dl, TSH levels 0.01 - 50 (mean = 17.14) mIU / l and 9-11 glycosylated hemoglobin range with 9.28% mean. Details are given in the table. 2.

Table 2: Blood sugar and thyroid hormone levels of control subjects and diabetic patients.

Characteristic	Control subject	Diabetic Pts.
Mean FBS	87.38 mg/dL	180.82 mg/dL
Mean HbA <sub>1c</sub>	5.23 %	9.28 %
Mean FT <sub>3</sub>	2.34 pg/dL	8.73 pg/DI
Mean FT <sub>4</sub>	1.11 ng/dl	2.14 ng/DI
Mean TSH	1.68 uU/mL	17-14 uU/MI

In the control group, no subject had abnormal thyroid levels. 7 (11.66%) of diabetic patients had subclinical hypothyroidism and hypothyroidism was noted in 21 (35%) patients. 4 (6.66%) male and 3 (5%) female were in the subclinical group,. In the hypothyroid group, male were7 (11.66%) and female were14 (23.33%).

**DISCUSSION:**

An important hormone secreted from endocrine gland is thyroid, which plays a vital role in carrying normal functions of human body<sup>12</sup>. It helps in metabolism of glucose along with proteins and lipids. Abnormal glucose metabolism has adverse effects on it. Endocrinopathies commonly seen in general population are diabetes mellitus, hyperthyroidism and hypothyroidism<sup>13</sup>. In general population 6.6% is

estimated in thyroid disorder. Its occurrence in diabetic population is estimated about 10.8%. Subclinical hypothyroidism frequency is 5.4% and frequency of clinical hypothyroidism is 4.1%.

Fig. 1: Frequency of hypothyroidism in type 2 diabetic pts.

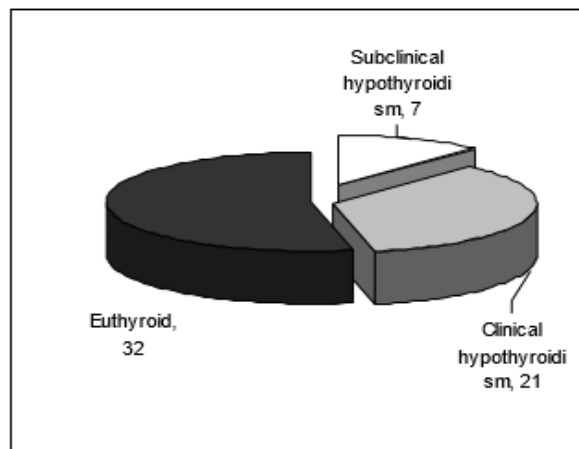
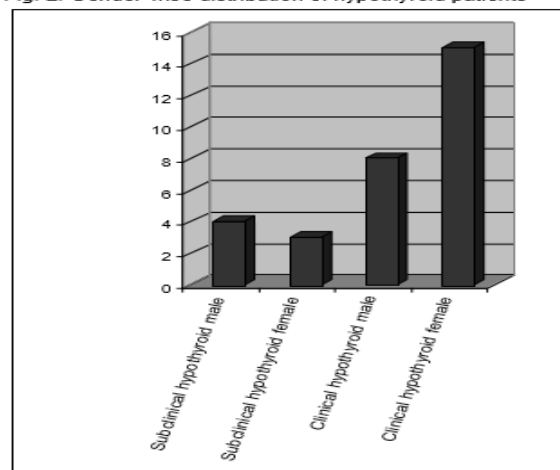


Fig. 2: Gender-wise distribution of hypothyroid patients



The occurrence of clinical hyperthyroidism is 5.1% and subclinical hyperthyroidism is 5.8%. On the basis of clinical examination, the diagnosis of thyroid dysfunction in diabetic patient is difficult because of poor glycemic which resembles to hyperthyroid effects like fatigue, weight loss in spite of increased appetite<sup>14</sup>. Moreover, diabetic renal failure seems as hypothyroidism as it indicates pallor, edema, fatigue and weight gain. In the whole population 6.6% of adults were affected by thyroid dysfunction found by Whickham survey. Abnormal TSH (31%) was high in type II diabetic patients reported by Celani et al. In the evaluation of diabetic patients, we determined 11.6% of subclinical hypothyroidism and 35% of hypothyroidism in diabetic patients, which is relatively greater compared to other patients. This may be due to the fact that patients concentrate only on diabetes

mellitus and its complications, rather than considering another partial or misdiagnosis. Therefore, it is essential to assess the diabetic population in terms of hypothyroidism, either clinically or subclinically, because one disorder may deteriorate the other if not treated by worsening control of worsening dyslipidemias, diabetes mellitus and producing various problems. Therefore, the diabetic population should be examined for hypothyroidism<sup>15</sup>. Additional significant studies should be done to assess the extent of the disease.

### CONCLUSION:

Hypothyroidism and Diabetes mellitus are common disorders in all populations. Frequency of hypothyroidism is more in population having diabetes in comparison to general population. Prevalence is higher in our population, needing the interest to study on large scale to know the magnitude of disease in order to prevent the diabetes patients from worse effects.

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