

## Original Article



# Hypothyroidism and Its Comorbidities - An Observational Study at A General Hospital

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### Abstract

**Background:** Hypothyroidism is the most common metabolic disorder that slows metabolism and leads to many medical conditions like diabetes (DM) and its complications like hypertension (HTN) and ischemic heart disease (IHD). **Objectives:** This study was conducted to determine the prevalence of various comorbidities in the hypothyroid population, to compare them, and to demonstrate that we can prevent those comorbidities through early detection and treatment of primary diseases such as hypothyroidism. **Materials and Methods:** An observational study was conducted in a general hospital in Faridpur from October 2019 to December 2020 for a period of one year and three months. A total of 170 hypothyroid patients were selected randomly from all sexes and races to see their comorbidities. Clinically suspicious patients were selected for laboratory testing and, after confirmation of hypothyroidism, comorbid conditions were searched for by clinical examination and biochemical tests where needed. All new and old patients were included as cases in this study. **Result:** 170 cases were selected as hypothyroidism out of a total of 3233 patients (5.25%). Female patients were more than male cases (134 vs. 36 and a ratio 3.2:1). More patients were above 50 years (29.41%). Comorbidities present most of the patients (88.82%). Most common comorbidities were HTN, DM, BA, and IHD (40%, 19.41%, 14.11%, and 11.76%, respectively). Common concomitant comorbidities were HTN with DM (15.23%) and HTN with IHD (11.25%). **Conclusion:** There is a high incidence of HTN, DM, BA, and IHD in association with hypothyroidism. Overt hypothyroid patients are more likely to suffer from HTN and DM. As a result, these comorbid conditions should be investigated in all hypothyroid patients.

**Key words:** Hypothyroidism, Hypertension, Diabetes Mellitus.

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## Introduction

Thyroid hormone is a highly metabolic hormone and it stimulates metabolism in our body. Its excess amount increases metabolism and its lower level slows metabolism.<sup>1,2</sup> The clinical manifestation of hypothyroidism is slowly progressive, and if not diagnosed and treated early, it can lead to fatal life-threatening conditions such as coma and death. In patients with hypothyroidism, appropriate hormone replacement will reduce clinical manifestations and the patient can lead a near-normal quality of life. It is associated with a reduced quality of life.<sup>3</sup> And when it is associated with other comorbid conditions, it then increases morbidity and mortality.<sup>3,5</sup> Long

term hypothyroidism may cause insulin resistance and lead to type 2 DM.<sup>6</sup> Subclinical hypothyroidism is associated with increased cardiovascular risk.<sup>7</sup> It is a known secondary cause of hypertension<sup>8</sup> and has also been linked to bronchial asthma.<sup>9</sup> Hypothyroid may also be associated with menstrual irregularities, fibrocystic disease of the breast, polycystic ovary, dyslipidemia, and depressive illness.<sup>10</sup> Replacement with hormones may improve these conditions. TSH levels should be measured as part of a screening test in patients with dyslipidemia, diabetes, and infertility.<sup>11</sup>

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## Materials and Methods

It was a prospective observational study that included 3233 patients who came for consultation in a general hospital in Faridpur from October 2019 to December 2020 for a period of one-year and three-month. Among these, 170 patients were diagnosed and selected as cases of hypothyroidism. Here, some common comorbidities like hypertension, diabetes, ischemic heart disease, asthma, infertility, depressive illness, and connective tissue diseases were selected for study. Clinically suspected cases were confirmed by random serum TSH ( $> 4.5$  mIU/L) level and, in some cases, total T4/FT4 was done. Old cases of hypothyroidism on drug therapy are also included as cases. New cases of diabetes were diagnosed with a fasting glucose level of  $> 7$  mmol/L, or 75 gm post-glucose blood sugar level ( $> 11.1$  mol/L), or HbA1C ( $> 6.5\%$ ). Old patients with known hypothyroidism and diabetes were also included as cases. For hypertension, known cases on treatment or new cases with a persistent rise in blood pressure ( $> 140/90$  mm Hg) in three consecutive records of blood pressure five minutes apart in a sitting position were included. Patients with known ischemic heart disease and hypothyroidism on treatment and new cases with ECG evidence of myocardial ischemia were included as cases. As cases, known cases of bronchial asthma with hypothyroidism and new cases with compatible clinical history and physical examination suggestive of asthma were included. Other cases like depressive illness, infertility, and connective tissue diseases were included by history and relevant physical examination.

## Results

Most of the hypothyroid patients were female (78.82%) and most affected individuals were aged over 40 years (27.05% of those aged 41–50 years and 29.41% of those aged  $> 50$  years). Table I

**Table I:** Age and Sex distribution (n=170)

		Number (%)
Sex	Male	35(21.17)
	Female	134(78.82)
Age	<20 years	09(5.29)
	20-30 years	30(17.64)
	31-40 years	35(20.51)
	41-50 years	46(27.05)
	>50 years	50(29.41)

Most of the hypothyroid patients had comorbidities (88.82%), and the most common comorbidities were hypertension, diabetes, and bronchial asthma (40%, 19.41%, and 14.11%, respectively). Concomitant common comorbidities were hypertension with diabetes (15.23%) and hypertension with ischemic heart disease (11.25%). Table II

**Table II:** Comorbidities and hypothyroidism (n = 170)

		Number (%)
No comorbidity		19(11.18%)
Presence of comorbidities		151(88.82%)
Common comorbidities	Hypertension	68(40.00)
	Diabetes	33(19.41)
	Bronchial asthma	24(14.11)
	Ischemic Heart disease	20(11.76)
	Infertility	14(8.23)
	Connective tissue diseases	12(7.05)
	Depressive illness	08(4.70)
Concomitant comorbidities	Hypertension with diabetes	23(15.23)
	Hypertension with ischemic heart disease	17(11.25)
	Diabetes with Ischemic heart disease	07(4.63)

## Discussion

Hypothyroidism is a common problem in aged females and is usually associated with other health conditions. In this study, the incidence of hypothyroidism was 5.25% (170 out of 3233 patients). Females were affected more than males (78.82% vs. 21.17%, respectively). Affected rates increased with age (20.58% for those between the ages of 31 and 40, 27.05% for those between the ages of 41 and 50, and 29.41% for those over 50). Most of the patients present with comorbidities (88.82% vs. 11.18%). The most common comorbidities were hypertension (40%), diabetes (19.41%), bronchial asthma (14.11%) and ischemic heart disease (11.76%). And other comorbidities were also significant, like infertility (8.23%), connective tissue diseases (7.05%) and depressive illness (4.70%). Among the connective tissue diseases, the most common were rheumatoid arthritis, SLE, and systemic sclerosis. Patients who presented without any comorbidity had a 11.18% (n = 19) rate. Concomitant common comorbidities were hypertension with diabetes (15.23%) and hypertension with ischemic heart disease (11.25%).

The incidence of hypothyroidism is common worldwide<sup>12</sup> and an estimated prevalence of 3-5%. In my study, it is slightly higher, probably due to nutritional deficiency in our female population.

A study was done by Anandhasayanam A in five leading endocrinology hospitals in Southern Tamil Nadu, India. They found males were (37.8%) and females (62.2%) with the highest affected mean age of 54.44. They found obesity at 28.2%, diabetes at 24.6%, with 22.6% hypertension, followed by 18.5% with respiratory disorders like asthma or COPD.<sup>13</sup> Female patients outnumbered male patients in my study, implying that our female populations are more prone to autoimmune diseases as a result of genetic factors and dietary

iodine deficiency. Affected age groups are similar in both studies. Diabetic and asthmatic patients with hypothyroidism are nearly similar in both studies, but hypertension is more in my study (40% vs. 22.6%). Here, genetic, environmental, and dietary factors may play some role in the high incidence of hypertension in this study.

Another study was done by Paul J in India. They found 34.1% of asthma, 31.7% of obesity, 31.7% of diabetes, and 29.3% of hypertension were associated with hypothyroidism.<sup>14</sup> Diabetes is less prevalent in our study because most diabetic patients are seen at the Diabetic Association Medical College Hospital, a large tertiary care facility located in the heart of Faridpur. Asthmatic patients were more common in their study, probably due to genetic and environmental factors playing some role.

Ashrafuzzaman SM in 2012 in Bangladesh, they found the incidence of IGT was 12.6% and overt diabetes was 8.6% among hypothyroid patients.<sup>15</sup> But in this study, the incidence is much higher (8.6% vs. 19.41%), probably due to changes in our lifestyle like sedentary work and consumption of junk food.

Hypothyroidism is a recognized cause of secondary hypertension. Many studies on the prevalence of hypertension in patients with hypothyroidism show elevated blood pressure values. Increased peripheral vascular resistance, low cardiac output, and volume-dependent, low plasma renin activity are all possible mechanisms.<sup>16</sup>

There is also a relationship between ischemic heart disease and hypothyroidism. A study was done among CCU admitted patients and found 17.2% of patients had abnormally raised TSH levels in previously undiagnosed cases and serum FT3 and FT4 were significantly lower and serum TSH was higher in ischemic heart disease patients than in healthy subjects.<sup>17,18</sup>

A study was done by Indu Verma among infertile women and they found 23.9% of them were hypothyroid patients.<sup>19</sup> In my study, the incidence is lower (8.23%) because most infertile patients directly visit a gynecologist or specialized infertility center.

Mirella P shows the relationship between depressive illness and hypothyroid disorder, and thyroid hormone supplements appear to accelerate and enhance the clinical response to antidepressant drugs. Beneventi F shows that there is a significant relationship between hypothyroidism and connective tissue disorders.<sup>20,21</sup>

## Conclusion

Hypothyroidism usually affects all body systems and remains in subclinical form before it becomes an overt presentation. Its effects on major systems like the cerebrovascular, cardiovascular, musculoskeletal, hematological system and others are profound. Failure of early diagnosis and initiating treatment causes multiple comorbidities, increases treatment costs, and even endangers human life. So it is wise to diagnose the cases in subclinical form. Patients suffering from resistant

hypertension, obesity, dyslipidemias, ischemic heart diseases, diabetes, infertility, depressive illnesses, and autoimmune connective tissue disorders should search for underlying hypothyroidism.

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