



## A Clinical Study of Hyperthyroidism in Tertiary Care Hospital

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### Abstract

**Background and Objective:** *Hyperthyroidism is a common clinical disorder all over world. It occurs at all ages, but is less common before the age of 15 and is an important cause of morbidity in the older age group. Hyperthyroidism is ten times more common in women than men and has a prevalence of 2.5-4.7 per 1000 women. Hyperthyroidism is affecting approximately 2 percent of women and 0.2 percent of men. Even though diagnosis in hyperthyroidism is generally straight forward, its prevalence varies among population.*

**Methods:** *Study included 75 patients attending outpatient department (OPD)/admitted in tertiary care Hospital fulfilling the inclusion and exclusion criteria.*

**Results:** *Study include 75 patients of hyperthyroidism in which 61 were females and 14 were male patients with female to male ratio of approximately 4.35:1. Incidence of hyperthyroidism is common in the age group between 31 to 40 years. Graves' disease (76%) was the most common cause of hyperthyroidism, followed by toxic multinodular goiter (18.7%) and toxic adenoma (5.3%). Majority (54.7%) of the patients presented within 12 months of symptom onset. The common clinical manifestations were nervousness (94.7%), increased sweating, heat intolerance and swelling in the neck (90.7%). The commonest signs were goiter (100%), warm skin (90.7%) and tremors (92%). 49.3% of the patients had sinus tachycardia and 9.3% of patients had atrial fibrillation.*

**Conclusion:** *Hyperthyroidism was common in the third decade and in females. Graves' disease was the most common cause of hyperthyroidism. Commonest clinical manifestations were nervousness, increased sweating, heat intolerance and swelling in the neck. Commonest signs were goiter, warm skin and tremors.*

**Keywords:** *Hyperthyroidism, Graves' disease, toxic multinodular goiter, Toxic adenoma.*

### Introduction

Hyperthyroidism is a pathological syndrome in which tissue is exposed to excessive amounts of circulating thyroid hormone. Hyperthyroidism is the diseases in which the thyroid gland synthesises and secretes excessive hormone. Thyrotoxicosis is refers to any condition in which there is an

excessive amount of circulating thyroid hormone, irrespective of whether the hormone is from a damaged gland (thyroiditis), is secreted by the gland (Graves' disease), or is exogenous (factitious thyrotoxicosis)<sup>[1]</sup>. Hyperthyroidism is ten times more common in women than men and has a prevalence of 2.5-4.7 per 1000 women<sup>[2]</sup>.

Hyperthyroidism is common, affecting approximately 2 percent of women and 0.2 percent of men<sup>[3]</sup>. Major etiologies of thyrotoxicosis are hyperthyroidism caused by Graves' disease, toxic multinodular goiter and toxic adenoms. The clinical presentation of hyperthyroidism depends on the severity of thyrotoxicosis, the age of the patient, the presence or absence of extrathyroidal manifestations and the specific disorder producing the thyrotoxicosis<sup>[4]</sup>. Majority of these are associated with enlargement of thyroid gland (Goiter). Graves' disease, the most common cause of hyperthyroidism is characterized by diffuse goiter, ophthalmopathy, positive thyroid peroxidase (TPO) antibodies and often a personal or family history of autoimmune disorders. Age of onset of thyrotoxicosis is usually late in majority of cases of multinodular goiter and autonomous toxic nodules with predominant effects on cardiovascular system.

## Methodology

### Source of data

Study included seventy five (75) patients attending outpatient department (OPD)/admitted in tertiary care hospital with signs and symptoms of hyperthyroidism during two years study period.

### Methods

Following collection of data in pretested proforma which included detailed history, physical examination and confirmation of hyperthyroidism by total triiodothyronine (T<sub>3</sub>), thyroxine (T<sub>4</sub>) and thyroid stimulating hormone (TSH) measured by Chemiluminiscence immunoassay on fully automated ACS:180:SE. Routine laboratory investigation like Haemoglobin (Hb), total count (TC), differential count (DC), erythrocyte sedimentation rate (ESR), peripheral blood smear (PBS), Random blood sugar (RBS), blood urea, serum creatinine, Electro cardiogram (ECG) and Chest x-ray postero anterior(PA) view were done for all patients.

## Inclusion Criteria

- 1) Age between 20-60 years.
- 2) Patients with history and clinical features suggestive of hyperthyroidism.
- 3) Laboratory criteria include increased triiodothyronine (T<sub>3</sub>) and thyroxine (T<sub>4</sub>) with decreased thyroid stimulating hormone (TSH) levels.
- 4) Only those cases of thyrotoxicosis that are caused by increased thyroid function.

## Exclusion criteria

1. Age less than 20 years and more than 60 years.
2. Hypothyroid patients.
3. Subclinical hyperthyroid patients.
4. Thyroid malignancy associated with hyperthyroidism.
5. Transient thyrotoxicosis of thyroiditis.
6. Hyperthyroidism associated with comorbid condition like diabetes mellitus (DM), hypertension (HTN), ischemic heart disease (IHD), chronic obstructive pulmonary disease (COPD) and chronic renal failure (CRF).

## Results

### 1. Age and Gender distribution

Age (in years)	Sex		Total
	Male	Female	
20-30	1 (7.1%)	20(32.8%)	21(28.0%)
31-40	7(50.0%)	28(45.9%)	35(46.7%)
41-50	4(28.6%)	9(14.8%)	13(17.3%)
51-60	2(14.3%)	4(6.6%)	6(8.0%)
Total	14(100%)	61(100%)	75(100%)

In the present study out of 75 patients, 35 (46.7%) patients were in the age group of 31-40 years followed by 21(28%) patients were in the age group of 20-30 years. 61(81.3%) patients were females and 14(18.7%) were male

### 2. Clinical Manifestations

Symptoms	Sex		Total
	Male	Female	
Nervousness	14 (100%)	57(93.4%)	71(94.7%)
Increased sweating	14(100%)	54(88.5%)	68(90.7%)
Heat intolerance	13(92.9%)	55(90.2%)	68(90.7%)
Palpitation	14(100%)	55(90.2%)	69(92.0%)
Swelling in the neck	12(85.7%)	56(91.9%)	68(90.7%)

Fatigue	13(92.9%)	52(85.2%)	65(86.7%)
Increased appetite	9(64.3%)	43(70.5%)	52(69.3%)
Weight loss	12(85.7%)	54(88.5%)	66(88.0%)
Breathlessness	5(35.7%)	31(50.8%)	36(48.0%)
Chest pain	-	6(9.8%)	6(8.0%)
Diarrhoea	2(14.3%)	9(14.8%)	11(14.7%)
Tremors	5(35.7%)	30(49.2%)	35(46.7%)
Oligomenorrhea	-	16(26.2%)	16(21.3%)
Constipation	1(7.1%)	1(1.6%)	2(2.7%)
Dysphagia	-	6(9.8%)	6(8.0%)

In the present study, the most common symptoms observed was nervousness 71(94.7%), increased sweating 68(90.7%), heat intolerance 68(90.7%), palpitation 69(92%), fatigue 65(86.7%), weight loss 66(88%) and swelling in the neck 68(90.7%)

### 3. Clinical Signs

Signs	Sex		Total
	Male	Female	
Pallor	1(7.1%)	10(16.4%)	11(14.7%)
Icterus	0	0	0
Lymphadenopathy	0	0	0
Warm skin	14(100%)	54(88.5%)	68(90.7%)
Goiter	14(100%)	61(100%)	75(100%)
Tremors	14(100%)	55(90.2%)	69(92.0%)
Pretibial myxedema	0	0	0
Exophthalmos	10(71.4%)	43(70.5%)	53(70.7%)
Proximal myopathy	1(7.1%)	4(6.6%)	5(6.7%)

In the present study, the most common signs observed was goiter 75(100%), warm skin 68(90.7%), tremors 69(92%) and exophthalmos 53(70.7%)

### 4. Duration of Symptoms

Duration of symptoms (in months)	Sex		Total
	Male	Female	
<12 months	8(57.1%)	33(54.1%)	41(54.7%)
12-24 months	4(28.6%)	22(36.1%)	26(34.7%)
>24 months	2(14.3%)	6(9.8%)	8(10.7%)

In the present study out of 75 patients, 41 (54.7%) patients had presented within 12 months of symptom onset, while 26(34.7%) patients had symptoms between 12 to 24 months.

### 5. Pulse Rate Variation

Pulse Rate (beats/min)	Sex		Total
	Male	Female	
>100	8(57.1%)	36(59.0%)	44(58.7%)
90-100	5(35.7%)	20(32.8%)	25(33.3%)
80-90	1(7.1%)	4(6.6%)	5(6.7%)
70-80	-	1(1.6%)	1(1.3%)

In the present study, 44(58.7%) patients had pulse rate more than 100 beats/minutes, followed by 25(33.3%) patients with pulse rate of 90 to 100 beats/minute.

## Results of Investigation Profile

### 6. Hemoglobin (Hb%)

Haemoglobin (g %)	Sex		Total
	Male	Female	
>13	3(21.4%)	9(14.8%)	12(16.0%)
10-13	10(71.4%)	40(65.6%)	50(66.7%)
7-10	1(7.1%)	12(19.7%)	13(17.3%)

In the present study, 50(66.7%) patients had haemoglobin 10-13 gram percent followed by 13(17.3%) patients with haemoglobin 7-10 gram percent.

### 7. Triiodothyronine (T<sub>3</sub>)

T <sub>3</sub> (ng/ml)	Sex		Total
	Male	Female	
2-5	10(71.4%)	45(73.8%)	55(73.3%)
5-8	4(28.6%)	14(23.0%)	18(24.0%)
>8	-	2(3.3%)	2(2.7%)

In the present study, 55(73.3%) patients had T<sub>3</sub> values of 2-5 ng/ml followed by 18(24%) patients with T<sub>3</sub> values of 5-85 ng/ml.

### 8. Thyroxine (T<sub>4</sub>)

T <sub>4</sub> (µg/ml)	Sex		Total
	Male	Female	
10-15	1(7.1%)	5(8.2%)	6(8.0%)
15-20	5(35.7%)	24(39.3%)	29(38.7%)
20-25	4(28.6%)	20(32.8%)	24(32.0%)
>25	4(28.6%)	12(19.6%)	16(21.3%)

In the present study, 29(38.7%) patients had T<sub>4</sub> values of 15-20 µgm/dl followed by 24(32%) patients with 20-25 µgm/dl.

### 9. Thyroid Stimulating Hormone (TSH)

TSH (µIU/ml)	Sex		Total
	Male	Female	
0.3-0.1	5(35.7%)	15(24.6%)	20(26.7%)
0.1-0.01	9(64.3%)	35(57.4%)	44(58.7%)
<0.01	-	11(18.0%)	11(14.7%)

In the present study, 44(58.7%) patients had TSH values of 0.1-0.01 µIU/ml followed by 20(26.7%) patients with 0.3-0.1 µIU/ml.

### 10. Electrocardiogram (ECG)

ECG changes	Sex		Total
	Male	Female	
Normal	6(42.9%)	25(41.0%)	31(41.3%)
Sinus tachycardia	6(42.9%)	31(50.8%)	37(49.3%)
Atrial fibrillation	2(14.3%)	5(8.2%)	7(9.3%)

In the present study, 37(49.3%) patients ECG showed sinus tachycardia, 31(41.3%) patients had normal ECG and 7(9.3%) patients had atrial fibrillation.

### 11. Chest X-Ray

Chest X-Ray	Sex		Total
	Male	Female	
Normal	14(100%)	55(90.2%)	69(92.0%)
Cardiomegaly	-	6(9.8%)	6(8.0%)

In the present study, 69(92%) patient's chest x-ray was normal and 6(8%) patients had cardiomegaly.

### 12. Type of Hyperthyroidism

Diagnosis	Sex		Total
	Male	Female	
G D	12(85.7%)	45(73.8%)	57(76.0%)
T MNG	2(14.3%)	12(19.7%)	14(18.7%)
T A	-	4(6.6%)	4(5.3%)

In the present study out of 75 patients, 57(76%) patients had Graves' disease (G D), 14(18.7%) patients had toxic multinodular goiter (T MNG) and 4(5.3%) patients had toxic adenoma (T A).

### Discussion

**Age:** Sydney C Werner in the Book "The Thyroid" mentions that hyperthyroidism can occur from birth to old age with a peak incidence in the third and fourth decades<sup>[5]</sup>. Zargar AH et al, in their study on 203 subjects of hyperthyroidism stated that, the mean age of hyperthyroidism was  $39.98 \pm 14.4$  years (range 9-70). The majority of the patients with toxic nodular goiter (including solitary as well as multinodular) were aged above 40 years, whereas the peak incidence of Graves' disease was between 20-40 years age group<sup>[6]</sup>.

Mean age of presentation in the present study was 36.8 years. Majority of patients (46%) were in the age group between 31-40 years followed by 28% in the age group between 20-30 years.

**Sex:** Michael M Kaplan in his study on 120 cases of hyperthyroidism reported that the women were affected 4-5 times more commonly than men<sup>[7]</sup>. Joll after reviewing the published data that all over the world, found a ratio of 4.4-8.2 for women to 1 for men. The average quoted ratio is about 4.5:1<sup>[8]</sup>.

In the present study, females were 81.3% and males were 18.7% giving a female to male ratio of approximately 4.36:1. Comparison with Zargar AH et al<sup>[6]</sup> study was 2.75:1. Overall present study showed a general female preponderance in hyperthyroidism.

**Type of Hyperthyroidism:** Michael M Kaplan from his study on 120 cases of hyperthyroidism reported Graves' disease, toxic multinodular goiter and toxic adenoma in 85.8%, 5.8% and 3.3% of cases respectively<sup>[7]</sup>. Zargar AH et al in their study on 203 subjects stated that the Graves' disease is the most common cause of hyperthyroidism contributing to 63.1% of cases where as toxic multinodular goiter and toxic adenoma contributed for 23.1%, 12.3% of cases respectively<sup>[6]</sup>. In the present study, out of 75 cases of hyperthyroidism 76% cases were Graves' disease, 18.7% were toxic multinodular goiter and 5.3% were toxic adenoma.

**Duration of Symptoms:** Sydney C Werner in the Book "The thyroid" describes that, duration of symptoms in hyperthyroidism can be as brief as few days or be a matter of 25 years or more<sup>[5]</sup>. In the present study significant percentage (54.7%) of patients were diagnosed within 12 months.

**Mode of Presentation:** The most common symptom observed in present study was nervousness (94.7% of patients). Spaulding SW et al reported nervousness was the most common symptom seen in 80-99% of patients. Weight loss and palpitations were second most common symptoms (88%, 92% of patients)<sup>[9]</sup>. In the study done by Williams RH et al, weight loss and palpitations were seen in 85% and 89% cases respectively<sup>[10]</sup>. Weight loss was seen in 52-85% of patients and palpitations in 63-89% of cases,

according to study done by Spaulding SW et al<sup>[9]</sup>. Other common symptoms observed in present study were increased sweating (90.7%), heat intolerance (90.7%), swelling in the neck (90.7%), fatigue (86.7%) and increased appetite (69.3%).

**Examination Findings:** The commonest signs observed in the present study were goiter (100%) and tremors (92%). Spaulding SW et al reported thyroid enlargement in 37-100% of cases and tremors in 40-97% of cases<sup>[9]</sup>. Williams RH et al observed goiter and tremors in 100% and 97% of cases respectively<sup>[10]</sup>. Warm skin was observed in 68 (90.7%) patients in present study. Spaulding S W et al observed warm skin in 76% of cases<sup>[9]</sup>, where as Williams RH et al in 97% of cases<sup>[10]</sup>. Eye signs were noted in 53(70.7%) patients in present study. Majority of these eye signs were observed in patients with Graves' disease. Eye signs were seen in 71% of cases according to William RH et al study. No patients in the present study had pretibial myxoedema. Jameson JL et al reported that pretibial myxoedema is rare, occurs in 5% of patients with Graves' disease<sup>[4]</sup>.

**Evaluation of Pulse Rate:** In the present study, 44 (58.7%) patients had pulse rate more than 100 beats per minute. Zargar AH et al study, observed that 63.5% patients had tachycardia<sup>[6]</sup>.

#### **Correlation of laboratory findings:**

**Haemoglobin:** In the present study, 13(17.3%) patients had haemoglobin value between 7-10 gm%. Spaulding SW et al mentioned that in hyperthyroidism, plasma volume is often increased more than red cell mass, which may explain a mild anaemia that does not appear to be done to any nutritional deficiency, but responds to treatment of underlying disease<sup>[9]</sup>.

**T<sub>3</sub>, T<sub>4</sub> and TSH evaluation:** In the present study, majority of TSH values were in a range from 0.1 to 0.01. In almost all cases both T<sub>3</sub> and T<sub>4</sub> were elevated (predominantly T<sub>4</sub>). There was no difference in T<sub>3</sub>, T<sub>4</sub> and TSH values among these

three common causes of hyperthyroidism. According to Larson PR et al<sup>[11]</sup> T<sub>3</sub>, T<sub>4</sub> values are comparatively lower in toxic multinodular goiter and toxic adenoma compared to Graves' disease and TSH values are not very much suppressed in the former, unless there is a long symptomatic period before the diagnosis is established. Zargar AH et al in their study on 203 subjects of hyperthyroidism did not find any significant differences among the three common causes of hyperthyroidism<sup>[6]</sup>.

**Chest x-ray evaluation:** In the present study, cardiomegaly was seen in 6(8%) patients. Zargar AH et al reported cardiomegaly in 9.8% cases of hyperthyroidism<sup>[6]</sup>.

**Evaluation of ECG:** In the present study, 7(9.3%) patients had atrial fibrillation. Sawin CT et al reported atrial fibrillation in 28% of individuals aged 60 years or above with a suppressed TSH<sup>[12]</sup>. In study done by Zargar AH et al atrial fibrillation was noted in 4.6% cases of Graves' disease, 14.8% cases of toxic multinodular goiter and 20% cases of toxic adenoma<sup>[6]</sup>.

#### **Conclusion**

Hyperthyroidism was common in the third decade of life. Females were more commonly affected than the males. Graves' disease was the most common cause of hyperthyroidism, followed by toxic multinodular goiter and toxic adenoma. Majority of patients presented within 12 months of symptom onset. The commonest clinical manifestations observed were nervousness, increased sweating, heat intolerance, swelling in the neck. The commonest signs observed were goiter, warm skin and tremors. 49.3% of the patients had sinus tachycardia and 9.3% of patients had atrial fibrillation.

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