

STUDY OF THYROID DYSFUNCTION IN ELDERLY PATIENTS AND ITS CLINICAL CORRELATION IN TERTIARY CARE HOSPITAL

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ABSTRACT

INTRODUCTION

Thyroid dysfunction in elderly is not uncommon. Thyroid abnormalities were more among females than in males. Clinical diagnosis is difficult to make but Thyroid Function Tests always help in diagnosing the disease. Subclinical state is equally common as clinical state in elderly population. As the age advances the incidence of thyroid disorders increase. The study was undertaken with an objective to study the spectrum of thyroid dysfunction in elderly and to correlate clinical symptoms with abnormal thyroid function. Thyroid disorders were present in 26%, overt hypothyroidism in 12%, subclinical hypothyroidism in 8% cases, hyperthyroidism in 3% and subclinical hyperthyroidism in 3% patients was noted. In this study, 36 patients were males and 64 were females. Females (20%) had high incidence of thyroid disorders than males (6%).

KEYWORDS

Thyroid Function Tests, Thyroid Peroxidase Antibody (TPO) Hypothyroidism, Subclinical Hypothyroidism, Hyperthyroidism, Subclinical Hyperthyroidism, Total Cholesterol, Malignancy, Papillary Carcinoma.

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INTRODUCTION: Thyroid gland dysfunction is common in the elderly and is associated with significant morbidity if left untreated. Thyroid gland undergoes slight "physiological" changes with ageing, either as a result of its participation in the senescence process or as an effect of other system changes. The changes can lead to either clinical/subclinical states of hypo/hyperthyroidism.

Hypothyroidism occurs in 10% of females and 2% of males in patients older than 60 years.¹ Hyperthyroidism, on the other hand, is more common in the younger population. The prevalence in the elderly is approximately 2%² but from another perspective, 10 to 15% of patients with hyperthyroidism are older than 60 years. In younger adults, the classic symptoms of thyroid dysfunction are usually present and make the diagnosis easier. In the elderly, the diagnosis is more often overlooked or misdiagnosed, as the symptoms are often subtle or absent and are easily confused with coexisting illnesses.

Symptoms may often be attributed to normal ageing, and a high index of suspicion of thyroid dysfunction in the elderly is needed. Interpretation of thyroid function tests in older adults is difficult because of the age dependent physiologic changes in thyroid function, coexistent chronic illness, and polypharmacy.³

TFT should be carried out in those with prior history of thyroid disorder, autoimmune diseases, unexplained disease states, cognitive dysfunction, hypercholesterolaemia states, weight loss or atrial fibrillation. Several studies have investigated the role of thyroid function in the ageing process.

There are subtle alterations in hypothalamic and pituitary function but normal feedback control of TSH secretion persists. In the thyroid itself, morphologic changes develop with age, but have little impact on thyroid hormone economy.

FT4 and Total T4	No Changes
FT3 and Total T3	Mild increase
rT3	Mild increase
TBG	No change
TSH	Mild decrease
Changes in thyroid function parameters in the healthy elderly³	

Hypothyroidism in older patients is most often primary, being caused by an autoimmune disorder, previous thyroidectomy, or application of treatment for hyperthyroidism. Organ-specific autoimmunity increases with advancing age and hence, Hashimoto thyroiditis remains the main cause of thyroid failure in older patients. The causes of primary hypothyroidism in the elderly include thyroid autoimmune disease, neck irradiation, and previous surgical or medical treatment of hyperthyroidism as well as drugs such as lithium or amiodarone.²

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Central (secondary or tertiary) hypothyroidism is less common but should always be considered when evaluating patients with low serum thyroid hormone (TH) levels. There is good evidence to recommend screening people over the age of 60 for hypothyroidism.

The most common cause for thyrotoxicosis in older people remains to be Grave’s disease (GD). However, toxic nodular goitre (TNG: Plummer’s disease) and iodine-induced hyperthyroidism are both more common in older patients than in younger ones. Hyperthyroidism can also have an atypical (apathetic) presentation in older patients compared with younger ones. Both a high index of suspicion and familiarity with these manifestations are needed to reach the diagnosis of apathetic hyperthyroidism.

The prevalence of multinodular goitre and toxic nodular adenomas tends to increase with age.^{1,4} Other causes of hyperthyroidism in older patients include exogenous TH ingestion and thyroiditis.

OBJECTIVES OF THE STUDY:

1. To assess the thyroid dysfunction in elderly population.
2. To correlate clinical symptoms with abnormal thyroid function.

MATERIALS AND METHODOLOGY:

Source of Data: 100 patients aged more than 60 years with clinical suspicion of thyroid disease were selected from Kurnool Medical College IPD of General Medicine were included in the study.

Method of Collections of Data: A prospective cross-sectional study of 100 patients aged more than 60 years admitted to General Medicine IPD of Kurnool Medical College who were suspected to be suffering from thyroid disorders or vague symptoms like generalised weakness, easy fatigability, lethargy, disinterest in daily activities to be suspicious of thyroid disorder, were subjected to detailed clinical examination & testing by biochemical means, as per proforma. Those who were found to have altered thyroid functions, thyroid antibody (TPO) test was done. In those patients, demographic details, anthropometric measurements & clinical details were collected. Cognitive function tests were done. When nodule was present, further relevant investigations like USG/FNAC neck was performed. CBP, RBS, lipid profile, ESR, ECG, echo (when indicated) was done.

The laboratory evaluation of thyroid function was done by estimation of serum T3, T4 and TSH levels by chemiluminescence assay method.

The Normal Values for the Laboratory in Elderly Are:

- T3- 0.4-1.8 ng/mL.
- T4- 5-10.7 mcg/dL.
- TSH- 5-8.9 nUY. nk.

When values of T3, T4 is low and TSH is high it is considered to be hypothyroidism.

If T3, T4 are normal and only TSH elevated, then it is considered to be subclinical hypothyroidism.

If values of T3, T4 are increased and TSH reduced, it is considered as hyperthyroidism.

If T3, T4 are normal and only TSH reduced from normal values, then it is considered to be subclinical hyperthyroidism.

TPO antibody was estimated using chemiluminescence method. Normal range in elderly is up to 34 IU/mL.

The method employed for FNAC of thyroid was, under aseptic precaution, using 10 mL sterile syringe and 22-24 G needle, aspirations were taken from two different sites of the thyroid gland. The aspirates were smeared over the glass slide and covered by a cover slip of 0.4 mm thickness. The slide dipped in the container containing the fixative 70-90% ethanol. Later, the slide was studied under the high power microscope. The reporting was done by the pathologist.

USG of thyroid performed using GE Voluson 730 Pro machine with the probe frequency of 6-12 MHz.

Chi square and Student t tests were used in the statistical analysis.

Inclusion Criteria: 100 patients aged more than 60 years with clinical suspicion of thyroid disorders were included in this study.

Exclusion Criteria:

- a) All patients who were acutely sick.
- b) Patients with established thyroid disorders.
- c) Patients on thyroid supplements and drugs known to alter the thyroid functions.
- d) Patients who have undergone thyroid surgery, taken radioactive iodine therapy.
- e) Patients on iodine containing vitamins or minerals.
- f) Patients evaluated with radiological tests using contrast media in the recent past.

RESULTS: In this study, 100 elderly patients who were suspected to be having thyroid disease as per inclusion & exclusion criteria were evaluated in detail with clinical examination and laboratory investigations, including thyroid function tests and TPO antibodies.

In this study, 26 patients were found to have abnormal thyroid function tests, of which 15 patients had clinical features suggestive of thyroid disorders (12+3). Remaining patients showed biochemical abnormality suggesting subclinical state.

Thyroid Disorders	No. of cases	Percentage (%)
Normal	74	74
Hypothyroidism	12	12
Subclinical hypothyroidism	8	8
Hyperthyroidism	3	3
Subclinical hyperthyroidism	3	3

Table 1: Spectrum of Thyroid Disorders in Elderly

Hypothyroidism was seen in 20% cases & 6% had hyperthyroidism. Out of which 12 had overt hypothyroidism and 8 had subclinical hypothyroidism. Overt hyperthyroidism was noted in 3 subjects and subclinical hyperthyroidism noted in 3 patients. This may be because, our study population comprised of patients admitted to hospital who are more likely to present with clinical features late in the course of the disease.

a. Age distribution of Thyroid disorders:

Age Range (in years)	Total No.	Thyroid Abnormalities	(%)
60-65	59	17	28.8
66-70	13	2	15.3
71-75	10	2	20
76-80	11	3	27.2
>80	7	2	28.5

Table 2

As the age advances, the incidence of thyroid disorder also increases. But between the age group of 60-65, the incidence is high. It may be due to large number of study subjects, in this group. When it was observed statistically between the groups, it was found significant P value-0.001

b. Sex distribution of thyroid dysfunction in elderly:

In the present study of 100 patients, 36 were males and 64 were females. We have found that a prevalence of thyroid dysfunction was more among females (20%) than in males (6%) showing a female preponderance. This was seen both hypo & hyperthyroid states. This may be because of increased autoimmune diseases observed in females.

In the present study, prevalence of thyroid disorders in males and females were 16% and 31% of which 14% females had hypothyroidism, 9.3% had subclinical hypothyroidism. 1.5% had hyperthyroidism and 6.2% had subclinical hyperthyroidism. Among males, hypothyroidism was seen in 8.3% Subclinical hypothyroidism was seen in 5.5%, hyperthyroidism in 2.7% and none had subclinical hyperthyroidism.

	Males	Females	Total
Hypothyroidism	5	15	20
Clinical	3(8.3%)	9(14%)	
Subclinical	2(5.5%)	6(9.3%)	
Hyperthyroidism	1	5	6
Clinical	1(2.7%)	2(1.5%)	
Subclinical		2(6.2%)	

Table 3

c. Clinical Features: The clinical features found in the present study are as follows.

All the patients suspected to be suffering from thyroid disorders had easy fatigability (100%), generalised weakness (100%) lethargy in 42.3%, anorexia in 38.4% cases.

When the symptoms were analysed on the basis of clinical state, they are as follows-

	Clinical (in %) (n=12)	Subclinical (in %) (n=8)
Easy fatigability	12(100)	8(100)
Generalised weakness	12(100)	8(100)
Lethargy/disinterest in daily activities	7(58.3)	4(50)
Anorexia	8(66.6)	2(25)
Swelling of limbs/face	8(66.6)	4(50)
Weight gain	6(50)	2(25)
Constipation	5(41.6)	2(25)

Table 4: Symptoms of hypothyroidism

Tissue metabolism is reduced in hypothyroidism giving rise to manifestations of easy fatigability, lethargy, disinterest in daily activities. Even in subclinical state also, there are minimal symptoms present suggesting thyroid disorder.

	Clinical (in %) (n=12)	Subclinical (in %) (n=8)
Sluggish ankle jerk	9(75)	2(37.5)
Dry/Coarse skin	8(66.6)	2(25)
Hoarseness	7(58.3)	2(25)
Goitre	3(25)	
Bradycardia (50-60/min)	4(33.3)	

Table 5: Signs of hypothyroidism

Classical features of hypothyroidism are seen in elderly also as in adult subjects, like dry skin, hoarse voice & sluggish ankle jerk. Bradycardia is seen only in 1/3rd subjects. Goitre is seen in 25% which is compared to adult - hypothyroidism.

	Clinical (in %) (n=3)	Subclinical (in %) (n=3)
Heat Intolerance, Sweating, Palpitations	2(100)	-
Weight Loss	2(100)	-
Increased appetite	2(100)	2(33.3)
Diarrhoea	-	-

Table 6: Symptoms of hyperthyroidism

Number of cases of hyperthyroidism is only 3 cases. All the features of hyperthyroidism are seen in elderly also.

	Clinical (%) (n=3)	Subclinical (%) (n=3)
Tremors	2(100)	1(25)
Goitre	1(50)	-
Tachycardia (110-120/min)	2(100)	-

Table 7: Signs of hyperthyroidism

No. of patients with hyperthyroidism were less (6), out of which 3 had frank features of hyperthyroidism and 3 had subclinical hyperthyroidism.

	TFT in Normal cases (n=74)	Hypothyroidism (n=12)	Subclinical Hypothyroidism (n=8)	Hyperthyroidism (n=3)	Subclinical Hyperthyroidism (n=3)
TSH	2.71±1.66	45.62±20.96	13.94±3.33	0.01	0.49±0.09
T3	1.20 ± 0.52	0.73±0.44	1.15±0.28	5.30±1.70	1.48±0.97
T4	6.92±1.70	3.31±2.70	5.62±2.39	22.80±2.96	8.45±2.33

Table 8: Table showing the Mean and SD for normal subjects and for different thyroid disorders

e. TPO antibodies: Were estimated in all cases with altered thyroid functions. TPO was positive in 19 cases (73%) of these cases.

	Total No.	TPO positivity
Hypo	12	12(100%)
Subclinical Hypo	8	6 (75) %
Hyperthyroidism	3	1(33%)
Subclinical Hyper	3	-

Table 9: thyroid abnormalities and TPO AB positivity

All patients with hypothyroidism 12(100%) had positive TPO antibodies, probably indicating auto immune cause for this disorder. 6(75%) patients with subclinical hypothyroidism were positive for TPO AB. Subjects with TPO positive subclinical hypothyroid cases are more likely to progress into frank hypothyroid state.^{5,6}

Hence follow up of these cases are essential to detect frank hypothyroidism.

1(33%) patient with hyperthyroidism was positive for TPO AB and none of the patients with subclinical hyperthyroidism had positivity. Hyperthyroidism is less likely to have TPO AB, and less autoimmune in nature, than hypothyroidism.

f. Lipid Abnormalities and Thyroid Dysfunction: Total patients having lipid abnormalities in this study was 36%.

Clinical features are quite obvious in overt hyperthyroidism but some early features are also present in subclinical state.

d. Thyroid Function Tests: The mean TSH values were higher & T3 & T4 values were lower in patients with overt hypothyroidism.

Subclinical hypothyroidism cases had high TSH values but T3, T4 values were within normal range.

Patients with overt hyperthyroidism had low TSH values, with increased T3, T4 levels, whereas subclinical hyperthyroid patients demonstrated a normal T3, T4 values with reduced TSH levels.

Thyroid state	No. of Patients with lipid abnormalities
Euthyroid	23
Hypothyroidism	6
Subclinical hypothyroidism	5
Hyperthyroidism	1
Subclinical hyperthyroidism	1

Table 10: Thyroid state and lipid abnormalities

Thyroid function abnormalities were seen in only 25% patients, but lipid abnormalities were seen in 36% patients. This could be because of other cause of dyslipidaemia seen in these elderly patients like DM, obesity.

Mean and SD for various biochemical values of lipids in patients with and without thyroid dysfunction			
Parameter	With normal thyroid function	With thyroid dysfunction	P Value
TG	174.42±46.44	206.32±69.54	0.55
T. CHOL	170.2±50.42	199.44±56.88	0.02
HDL	43.12±8.42	43.44±11.01	0.89
LDL	99.77±30.65	121.28±47.03	0.04

Table 11: Lipid abnormalities and thyroid dysfunction

Patients with thyroid dysfunction have higher values of TGs, T. Chol and LDL which was found to be statistically significant. (p value <0.05).

Parameter	Hypothyroidism	Subclinical Hypothyroidism	Hyperthyroidism	Subclinical Hyperthyroidism
TG	221.27±72.94	206.66±69.16	169.5±43.13	175±85.77
T. Chol	203.54±50.51	216.22±67.14	189.5±20.50	140.66±34.48
HDL	44.09±12.91	44.33±10.30	42.5±2.12	39±12.52
LDL	120.0±48.57	129.33±57.20	119.0±18.38	103.33±26.57

Table 12: Comparison of lipids in different thyroid abnormalities

Participants with overt hypothyroidism have increased levels of TGs as compared to other lipids.

We noted that patients with subclinical hypothyroidism have increased levels of total cholesterol and LDL levels as compared to overt hypothyroidism, but it was not found to be statistically significant.

Hyperthyroidism was not associated with gross lipid alterations. HDL levels was normal in all groups.

g. ECG Changes and Thyroid State: ECG changes were seen in 10 patients.

ECG change	Thyroid state	No. of Patients
Bradycardia	Hypothyroidism	5
Tachycardia	Hyperthyroidism	2
Low voltage complex	Hypothyroidism	1
IHD	Hypothyroidism	1
VPC	Euthyroid	1

Table 13

Sl. No.	USG	FNAC	Thyroid state
1	Single Nodule	Diffuse Toxic Hyperplasia	Hyperthyroidism
2	Diffuse Thyroiditis	B-cell lymphoma of MALT type with extensive plasma cell differentiation in a background of Hashimoto’s thyroiditis.	Hypothyroidism
3	Multinodular goitre	Hashimoto’s thyroiditis	Hypothyroidism
4	Multinodular goitre	Follicular variant of papillary carcinoma	Hypothyroidism

USG FNAC of Thyroid gland and clinical state

Among patients having goitre, 3 of them had hypothyroidism and one had hyperthyroidism. Hashimoto’s thyroiditis was seen in one subject.

We noted malignancy in 2 patients having thyromegaly, one was follicular variant of papillary carcinoma and the other a primary thyroid lymphoma, which is a rare tumour of thyroid gland.

DISCUSSION: Thyroid diseases are common clinical problems associated with ageing. Thyroid disorders in the elderly are associated with significant morbidity if they are not treated. In the elderly, the diagnosis is more often overlooked or misdiagnosed, as the symptoms are often subtle or absent and are easily confused with coexisting illnesses.

The present study is compared with other studies from India & abroad, it shows some variation in the pattern of the disease. It may be because of variation in sample size or ethnic variation. In spite of these minor variations, many of the findings in the present study are in congruence with the previous studies.

A total of 100 patients were studied. All these patients comprised of rural population. Out of these 100 patients, 64 are females and 36 are males. We have found that 26% patients have thyroid disorders.

We have noted that as the age advances the incidence of thyroid dysfunction increases (p value significant). The reason for this observation may be the increased occurrence of physiologic and anatomic changes in the thyroid which are more pronounced as the age advances.

	Anne R Cappola et al ⁷	P. Lglesias et al ⁸	Raman Kumar Marwaha et al ⁹	Present study
Total thyroid abnormalities %	18.33	13.4	28.8	26
Males (%)	4.43	4.3	11.2	6
Females (%)	13.9	9	17.6	20

Table 14: Comparative studies—prevalence of Thyroid disorders in elderly and sex wise distribution: (> 60 years)

Thyroid abnormalities seen in different studies were variable. Western studies showed a lower incidence compared to Indian series. It may be due to selection bias as present study has selected strongly suspicious cases for

the study. Another factor is the number of cases studied by the other authors are more. Hence the incidence may be less in other series than the present series.

We noted a higher prevalence of thyroid dysfunction in females which is comparable to other studies, because of autoimmune nature of the disease.

	AML Chau¹⁰	Anne R Cappola et al⁷	Glauca et al¹¹	Lglesias et al⁸	Raman Kumar Marwaha et al⁹	Present Study
Total Patients	184	2639	399	447	1277	100
Hypothyroidism	13.1%	1.6%	4.3%	3.1%	2.5%	12%
Subclinical hypothyroidism	2.2%	15%	8.1%	6%	25%	8%
Hyperthyroidism	0.5%	0.23%	0.8%	5%	0.8%	3%
Subclinical hyperthyroidism	-	1.5%	6.5%	2.2%	0.5%	3%

Table 15: Comparative studies of Prevalence of thyroid abnormalities in elderly

Present study noted overt hypothyroidism and subclinical hypothyroidism in almost equal proportion when compared to other studies which demonstrated a more prevalence of subclinical hypothyroidism. This could be attributed to the late presentation of the rural population who have lack of knowledge about their symptoms and attribution of the symptoms to nonspecific illnesses or prompt intake of symptomatic therapy prescribed by the local doctors or quacks. The difference may be due to genetic factors also. The difference in the prevalence of TPO antibodies in our population group could also be a contributing factor for this difference, as positivity of TPO antibodies is the key determinant for conversion of subclinical hypothyroidism to clinical hypothyroidism.

Our study population had frank features of hypothyroid state compared to Chassagne P et al as our patients presented late in the course of the disease. Hence the clinical features are more pronounced than the other series.

Easy fatigability and generalised weakness are the most predominant features seen in our study.

Sluggish ankle jerks/hung up reflex which are a good indicator of hypothyroidism was seen in 45% patients with hypothyroidism. Goitre is seen in 15% of patients. Not many papers have noted clinical features of thyroid disorders in elderly for comparison purpose.

Number of cases of hyperthyroidism are only six, hence the clinical features are not compared. But all the features are more pronounced as the patients presented to us in advanced state of the disease compared to Trivalle C, Doucet J, Classagne study.¹²

In our study, patients with hyperthyroidism presented with features of weakness, fatigability, heat intolerance, increased sweating, although diarrhoea was not seen in any patient.

TPO Antibodies and Thyroid Disorders: Our study noted a high (73%) prevalence of TPO positivity among patients detected to have thyroid dysfunction, this is more common in hypothyroidism.

Studies	Mitra Niafar¹³	Parle JV et¹⁴	Sirkka Kontiainen et al¹⁵	Present study
Percentage of TPO positivity	60.6	60	47	73

Table 16: Comparative table of TPO AB positivity

Predominantly patients with TPO positivity were hypothyroid, indicating an autoimmune aetiology (Hashimoto's thyroiditis, chronic lymphocytic thyroiditis) as the most common cause of thyroid dysfunction in elderly.

Autoimmune thyroiditis and positive results for thyroid autoantibody increase in proportion as age advances.¹⁶

In this study, patients having subclinical hypothyroidism in whom TPO was positive was 75% indicating a higher risk of these patients progressing to overt thyroid failure state. This high prevalence of thyroid antibodies in the study population as well as previous studies necessitates the need for formulation of guidelines for detection and treatment of subclinical thyroid states.

In all the studies, thyromegaly was seen. But in our series, there were more cases (4) and two of them had thyroid malignancy which is rare.

In our study, we noted goitre in 4 patients. The spectrum varied from benign goitre to malignancy.

Bagchi et al¹⁷ described an increased prevalence of goitre in elderly. T. Bjuro et al¹⁸ demonstrated a prevalence of 15.13% of goitre in their study.

The prevalence of clinically apparent thyroid cancer in adults aged 50 to 70 years is estimated to be 0.1%.¹⁹ As patients age, there is a greater incidence in poorly differentiated types of thyroid cancer.²⁰ We noted a case of thyroid lymphoma in the back ground of Hashimoto's thyroiditis, which is a rare case.

It has been reported that thyroid lymphoma accounts for 1.8-8% of all thyroid malignancies.²¹ A strong association of malignant lymphoma with Hashimoto's thyroiditis has frequently been reported as noted in our case.²²

In this study, we have also seen disturbances in lipid profile in patients with thyroid dysfunction. Anne R Cuppola⁷ noted that individuals with hypothyroidism had the highest levels of serum total and low-density lipoprotein cholesterol.

In the present study, we found higher values of total cholesterol in subjects with subclinical hypothyroidism. There was no much variation in HDL levels in both the studies.

John P. Walsh et al and Iglesias P et al,⁸ in their studies, found a similar increase in lipid abnormalities in patients of subclinical hypothyroidism. John P. Walsh et al also noted that increased total cholesterol and LDL level increased the cardiovascular morbidity and mortality.

CONCLUSIONS:

1. Thyroid dysfunction in elderly is not uncommon.
2. One fourth of geriatric patients admitted to our wards exhibited alterations in thyroid functions tests.
3. Thyroid abnormalities were more among females (20%) than in males (6%).
4. Clinical diagnosis is difficult to make but TFT always helps in diagnosing the disease.
5. Subclinical state is equally common as clinical state in elderly population.
6. As the age advances the incidence of thyroid disorders increases.
7. Hypothyroidism was more common than hyperthyroidism.
8. An increased prevalence of TPO AB was observed in the hypothyroid patients suggesting autoimmune aetiology of thyroid dysfunction.
9. Dyslipidaemia was noted in patients with thyroid abnormalities as compared to patients with normal TFT.
10. A strong clinical suspicion of thyroid diseases should be considered in elderly patients who present with vague symptoms like generalised weakness, easy fatigability, lethargy and disinterest in daily activities.
11. Elderly patients should be screened for thyroid dysfunction.

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