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PREVALENCE, CLINICAL MANIFESTATIONS, AND COMORBIDITIES OF HYPOTHYROIDISM IN THE GERIATRIC POPULATION: A CROSS-SECTIONAL STUDY

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Abstract

Background: Hypothyroidism is a common but often underdiagnosed condition in the elderly due to its nonspecific presentation, which overlaps with normal aging and comorbidities. This study aims to assess the prevalence, clinical manifestations, and associated comorbidities of hypothyroidism in the geriatric population. **Methods:** A cross-sectional observational study was conducted at the Department of Medicine, Pt. B.D. Sharma PGIMS, Rohtak, over one year. A total of 100 geriatric patients (>60 years) with suspected thyroid dysfunction were enrolled. Clinical history, physical examination, and laboratory investigations were performed. Statistical analysis using SPSS version 21 included descriptive statistics and correlation analyses to assess associations between hypothyroidism and clinical parameters. **Results:** The mean age was 66.16 ± 5.54 years, with 59% aged 61–65 years. Hypothyroidism was more prevalent in females (87%) than males (13%). Common symptoms included easy fatigability (53%), generalized weakness (15%), and weight gain (10%). Hypertension (36%) was the most frequent comorbidity, followed by diabetes (15%). Clinical findings included bradycardia, dry skin, and pallor. Autoimmune thyroid disease accounted for 20% of cases, while 75% had an undetermined etiology. **Conclusion:** Hypothyroidism is highly prevalent but often overlooked in elderly patients, particularly women. The nonspecific nature of symptoms and the presence of multiple comorbidities complicate timely diagnosis and management. Routine screening in high-risk individuals and personalized treatment strategies are crucial for improving clinical outcomes and quality of life in geriatric patients.

Keywords: Hypothyroidism; Geriatric population; Prevalence

Introduction

The worldwide rise in the old demographic is a major demographic shift of the 21st century, mostly propelled by enhancements in healthcare, better living standards, and medical breakthroughs. These enhancements have resulted in a general rise in life expectancy and a decline in death rates, especially from infectious diseases and acute illnesses. As the ageing population increases, there is a

concomitant rise in age-related health issues, including chronic illnesses such as cardiovascular disorders, diabetes, neurodegenerative diseases, and endocrine dysfunctions. Thyroid problems, especially hypothyroidism, provide a serious concern owing to their considerable effects on metabolism, energy equilibrium, and general health.[1] Hypothyroidism is a disorder marked by inadequate synthesis of thyroid hormones, chiefly thyroxine (T4) and triiodothyronine (T3), by the thyroid gland. These hormones are essential for the regulation of metabolism, cardiovascular function, and neurological activities. A deficit in thyroid hormone production may result in many clinical symptoms, impacting numerous organ systems. In senior persons, hypothyroidism is especially alarming due to its frequent manifestation of unusual and nonspecific symptoms, including tiredness, cognitive loss, memory impairment, depression, xerosis, weight gain, constipation, cold sensitivity, and muscular weakness. These symptoms may be readily misattributed to typical ageing or other chronic conditions, complicating prompt diagnosis and action.[2] The incidence of hypothyroidism in the elderly varies according to geographic region, iodine levels, and demographic attributes. Research indicates that hypothyroidism is more prevalent in older persons than in younger ones, with a greater incidence seen among women. Autoimmune thyroid diseases, especially Hashimoto's thyroiditis, are the predominant cause of hypothyroidism in the elderly. Iodine deficiency is a notable risk factor in some groups, leading to thyroid dysfunction. Age-related modifications in thyroid physiology, including a reduction in iodine absorption and changes in thyroid hormone metabolism, lead to a heightened risk of hypothyroidism in the elderly.[3] A significant issue in addressing hypothyroidism in the elderly is the coexistence of several comorbidities, such as cardiovascular disease, hypertension, diabetes, osteoporosis, and neurodegenerative illnesses. These diseases may complicate the diagnosis and management of hypothyroidism. Moreover, polypharmacy—a prevalent concern among older adults—can influence thyroid hormone levels and metabolism, either by hindering thyroid hormone absorption or by modifying its bioavailability. Medications include proton pump inhibitors, calcium supplements, and certain antidiabetic agents may influence the efficacy of thyroid hormone replacement treatment. This requires meticulous oversight and personalised treatment approaches to guarantee optimum control of hypothyroidism in geriatric individuals.[4] Timely identification and effective care of hypothyroidism in the elderly are essential for averting problems and enhancing quality of life. Routine screening for thyroid dysfunction in older persons is contentious, with several recommendations advocating for screening at-risk individuals, especially those with a history of autoimmune diseases, a familial predisposition to thyroid problems, or unexplained clinical manifestations. Considering the widespread occurrence of subclinical hypothyroidism in senior adults, it is crucial to comprehend its clinical implications and long-term effects. Some studies indicate that subclinical hypothyroidism may increase the risk of cardiovascular disease and cognitive impairment, while others contend that modest thyroid malfunction may not need therapy, especially in asymptomatic persons.[5] Despite the increasing awareness of hypothyroidism as a prevalent disorder among the elderly, further study is required to evaluate its clinical characteristics, risk factors, and effects on overall health outcomes.[6] This research seeks to assess the prevalence, clinical manifestations, and related comorbidities of hypothyroidism in geriatric adults. This study aims to elevate awareness and comprehension of thyroid dysfunction in elderly people by analysing clinical features and prospective risk factors, therefore enhancing diagnostic precision and therapy optimisation.

Method

Study Design

This cross-sectional observational study was conducted at the Department of Medicine, Pt. B.D. Sharma PGIMS, Rohtak. Patients admitted to the wards and those attending the outpatient department (OPD) at PGIMS, Rohtak, were enrolled. After obtaining written informed consent and a detailed medical history, each participant underwent comprehensive clinical, biochemical, and radiological evaluations to assess hypothyroidism in the geriatric population.

Study Duration
The study was conducted over a period of one year.

Sample Size Calculation
Based on previous studies, the prevalence of hypothyroidism in the geriatric population was reported to be 25% and 28%. Using these values, the minimum required sample size was estimated to achieve a 95% confidence interval and 80% power, assuming a 30% non-response rate. The final sample size was **97 patients**.

Inclusion Criteria
1. Patients willing to provide written informed consent.
2. Individuals aged **above 60 years** diagnosed with hypothyroidism.

Exclusion Criteria
1. Patients who refused to participate in the study.
2. Patients with severe left ventricular (LV) dysfunction, chronic kidney disease (CKD) stage 3-4, decompensated chronic liver disease (CLD), or malignancy.

Methodology
Eligible participants meeting the inclusion criteria were enrolled after obtaining informed consent from either the patient or their caretaker. A total of **100 geriatric patients (aged >60 years)** with clinical suspicion of thyroid disorders were included.

Clinical History:
A detailed history was recorded, including:
- Substance abuse and addictions
- Presenting complaints
- Opportunistic infections
- Treatment history (thyroid supplements and medications that may influence thyroid function)

Clinical Examination:
A thorough physical examination was performed, including:
- **General physical examination:** Anthropometric measurements, vital signs, pallor, icterus, cyanosis, clubbing, lymphadenopathy, pedal edema, jugular venous pressure, and a head-to-toe assessment.
- **Systemic examination:** Cardiovascular system (CVS), respiratory system (RS), per abdomen (PA), and central nervous system (CNS).

Statistical Analysis
Data were pre-coded, entered into an Excel sheet, and analyzed using **SPSS version 21**.
- **Descriptive statistics** were used to analyze demographic data (mean, median, standard deviation, and interquartile ranges).
- **Chi-square test** was used for categorical variables.
- **Karl Pearson correlation** was applied to assess the association between clinical symptoms and abnormal thyroid function in the geriatric population.

A **p-value <0.05** was considered statistically significant.

Results
The present study was conducted in the Department of General Medicine, PGIMS, Rohtak, India. A total of 100 patients aged above 60 years were included. These patients were either suspected of having thyroid disorders or exhibited vague symptoms such as easy fatigability, generalized

weakness, lethargy, and disinterest in daily activities, which raised clinical suspicion of hypothyroidism.

Table 1: Age Distribution

Age Group (Years)	N	%
61-65	59	59
66-75	32	32
>75	9	9
Total	100	100

Mean ± SD: 66.16 ± 5.54

In this study, the mean age of participants was **66.16 ± 5.54 years**. The majority (59%) belonged to the 61-65 years age group, followed by **32% of participants in the 66-75 years category**. Only **9% of participants were older than 75 years**. A significant association was observed between aging and the likelihood of developing thyroid disorders ($p \leq 0.001$). The incidence of hypothyroidism was highest in the **61-65 years age group**, indicating that thyroid dysfunction becomes more prevalent with increasing age.

Table 2: Gender Distribution

Gender	N	%
Male	13	13
Female	87	87
Total	100	100

Among the 100 participants included in the study, **87% were female, and 13% were male**. The data suggests that hypothyroidism was significantly more prevalent in females than in males. The higher prevalence in females could be attributed to the increased incidence of autoimmune disorders, which are known to contribute to thyroid dysfunction. Autoimmune thyroid diseases, such as Hashimoto's thyroiditis, are far more common in women than in men, which could explain this gender disparity.

Table 3: Symptom Distribution

Symptoms	N	%
Easy Fatigability	53	53
Generalized Weakness	15	15
Weight Gain	10	10
Anorexia	7	7
Constipation	6	6
Paresthesia	4	4
Cold Intolerance	2	2
Hoarseness of Voice	3	3
Total	100	100

The most frequently reported symptom was easy fatigability (53%), followed by generalized weakness (15%). Other commonly observed symptoms included weight gain (10%), anorexia (7%), constipation (6%), paresthesia (4%), cold intolerance (2%), and hoarseness of voice (3%). Easy

fatigability and generalized weakness were predominant symptoms among hypothyroid patients, which is consistent with the known physiological effects of hypothyroidism. Since hypothyroidism results in a decline in tissue metabolism, it leads to fatigue, weakness, and reduced energy levels, significantly impacting an individual's ability to perform daily activities.

Table 4: Comorbidity Distribution

Co-Morbidities	N	%
Hypertension	36	36
Diabetes	15	15
No Comorbidities	49	49

Approximately **49% of participants had no comorbidities**, while **36% had hypertension**, making it the most common coexisting condition. Diabetes was observed in **15% of the participants**. Hypertension and diabetes are frequently associated with thyroid disorders, as thyroid hormones play a crucial role in regulating cardiovascular and metabolic functions. Uncontrolled hypothyroidism can lead to increased **vascular resistance, elevated blood pressure, and metabolic disturbances**, which may contribute to the development of hypertension and diabetes in affected individuals.

Table 5: General Physical Examination

Parameter	Mean ± SD	Median (IQR)	Range
Systolic BP (mmHg)	123.95 ± 14.30	122 (110-130)	100 - 160
Diastolic BP (mmHg)	77.18 ± 8.18	80 (70-80)	40 - 90
Pulse Rate (/minute)	75.69 ± 7.17	76 (74-80)	55 - 90

Shapiro-Wilk test results indicated that **systolic blood pressure ($p = 0.001$), diastolic blood pressure ($p < 0.001$), and pulse rate ($p < 0.001$) were not normally distributed**. The mean systolic blood pressure was **123.95 ± 14.30 mmHg**, and the mean diastolic blood pressure was **77.18 ± 8.18 mmHg**. A **reduced pulse rate** was observed in many patients, which is consistent with **bradycardia**, a well-known effect of hypothyroidism on cardiovascular function.

Table 6: BMI Distribution

BMI (kg/m²)	N	%
<18.5	6	6.0
18.5-22.9	27	27.0
23.0-24.9	24	24.0
25.0-29.9	34	34.0
30.0-34.9	7	7.0
35.0-39.9	2	2.0

A significant proportion of patients (**34%**) had a **BMI between 25-29.9 kg/m²**, indicating a higher prevalence of overweight individuals. Hypothyroidism is known to contribute to weight gain due to **reduced metabolic rate, fluid retention, and decreased caloric expenditure**.

Table 7: Clinical Signs

Signs	N	%
No Findings	47	47
Pallor	13	13
Dry Skin	8	8
Obesity	8	8
Bradycardia	6	6
Pedal Edema	5	5
Goiter	5	5

Pallor (**13%**), dry skin (**8%**), obesity (**8%**), and bradycardia (**6%**) were common findings. These clinical features are characteristic of **hypothyroidism-related metabolic slowdown** and hormonal imbalance.

Table 8: Etiology of Hypothyroidism

Etiology	N	%
Unknown	75	75.0
Autoimmune	20	20.0
Anti-Thyroid Drugs	3	3.0

The etiology of hypothyroidism remained **undetermined in 75% of cases**. However, **20% of patients were diagnosed with autoimmune thyroid disease**, which remains one of the most common causes of hypothyroidism.

Discussion

The increasing global elderly population represents a significant demographic shift, largely driven by advancements in healthcare, improved living conditions, and medical breakthroughs. These factors have contributed to longer life expectancy and an enhanced quality of life for older individuals. With improved access to healthcare and a deeper understanding of various diseases, mortality rates have declined, further extending human lifespan. However, this demographic change presents challenges for healthcare systems, social support structures, and economic stability, particularly in developing countries where resources and infrastructure may be inadequate.[7]

Hypothyroidism is a common condition among older adults, posing unique diagnostic and treatment challenges. In the elderly, symptoms such as fatigue, depression, cognitive decline, and constipation can be atypical and are often mistaken for other age-related health issues, complicating accurate diagnosis. Additionally, the presence of multiple comorbidities, including cardiovascular disease, diabetes, and osteoporosis, further complicates management. Medications for these conditions can also affect thyroid hormone levels or absorption, making treatment more challenging.[8,9]

Increased clinical awareness is essential when assessing hypothyroidism in the elderly due to its subtle presentation. In this study, the mean age of participants was 66.16 years, with the most common age group being 61-65 years (59%). Previous research by Bemben et al. found that the majority of hypothyroid individuals were aged 65-74 years, aligning with our findings.[10] Similarly, studies by Unnikrishnan et al. and Hollowell et al. indicate that hypothyroidism becomes more prevalent with advancing age, whereas hyperthyroidism is more frequently observed in younger populations.[11,12]

The primary cause of hypothyroidism in older adults is often autoimmune thyroid dysfunction, particularly Hashimoto's thyroiditis, which increases in prevalence with age. This condition results in the immune system attacking the thyroid gland, leading to impaired function due to the presence of

autoantibodies. Another crucial factor contributing to hypothyroidism in the elderly is iodine deficiency, exacerbated by dietary restrictions and reduced iodine absorption. Aging also reduces thyroidal iodine uptake, leading to lower thyroxine (T4) secretion. However, this decline is often counterbalanced by a decreased metabolic clearance of T4, primarily due to reduced activity of 5'-deiodinase enzymes.[13] Kim et al. reported similar findings in a study on the Korean population, noting that overt hypothyroidism was present in 1.22% of individuals aged 60-69 years and 0.58% in those aged 70 years and older.[14]

Our study found that hypothyroidism was more prevalent in females, accounting for 87% of cases. This observation aligns with previous research by Cappola et al[15]., Sharma et al.[16], Flatau et al.[17], and Suram et al.[18] Studies by Cappola et al. reported that 15% of elderly individuals had subclinical hypothyroidism, with 1.6% experiencing overt hypothyroidism, and that women were more frequently affected than men.[15] Sharma et al. observed a hypothyroidism prevalence of 16.36%, with 9.70% in females and 6.66% in males.[16] Flatau et al. found a female-to-male ratio of 3:1, with 14% of participants diagnosed with hypothyroidism.[17] Suram et al. attributed the higher prevalence in females to increased susceptibility to autoimmune diseases.[18] Similarly, Madhuvan et al. reported a higher prevalence of thyroid dysfunction in females (18%) compared to males (7%).[19]

In our study, the most frequently reported symptoms among hypothyroid patients were fatigue, followed by generalized weakness, weight gain, anorexia, constipation, paresthesia, cold intolerance, and hoarseness of voice. These findings are consistent with studies by Sharma et al.,[16] who identified weight gain as the most common symptom, followed by dry skin. Doucet et al. highlighted easy fatigability (67%) as the most prevalent symptom,[20] while Sharma et al. found that all patients suspected of having thyroid disorders exhibited easy fatigability (100%) and generalized weakness (100%).[16] Similar trends were reported by Madhuvan et al., who noted symptoms such as fatigue (100%), generalized weakness (100%), lethargy (26%), and anorexia (20%).[19]

The most common comorbidity in our study was hypertension (36%), followed by diabetes (15%). Sharma et al. also reported hypertension as the most prevalent comorbidity (32.73%), with ischemic heart disease being the least common (4.24%).[16] Madhuvan et al. found that 6 patients were diabetics, 12 were known diabetics, and 4 were newly diagnosed.[19] Lage et al. observed that dyslipidemia (75.6%), hypertension (69.3%), type 2 diabetes (28.7%), coronary artery disease (17.0%), obesity (17.0%), and depression (12.8%) were among the most common comorbidities in hypothyroid patients.[21] Suram et al. noted severe diabetic complications in patients with subclinical hypothyroidism.[18]

In our study, the mean systolic BP was 123.95 ± 14.30 mmHg, diastolic BP was 77.18 ± 8.18 mmHg, pulse rate was 75.59 ± 7.40 beats per minute, weight was 60.13 ± 10.14 kg, height was 156.10 ± 9.79 cm, and mean BMI was 24.64 ± 4.27 kg/m². These values align with Sharma et al., who reported a mean height of 161.79 ± 4.84 cm and weight of 71.14 ± 10.91 kg among elderly patients, with a mean BMI of 27.22 ± 4.33 kg/m².[16] Pasqualetti et al. observed that changes in blood pressure could lead to earlier atherosclerosis in subclinical hypothyroid patients.[22]

Obesity was a common finding in our study, with a mean BMI of 24.64 kg/m². Verma et al. found that 33% of obese individuals had overt hypothyroidism and 11% had subclinical hypothyroidism, with obesity being more prevalent in overt cases (46%) than in subclinical hypothyroidism (34%).[23] Akbar et al. reported a BMI of 29.5 ± 5.3 kg/m² in hypothyroid females, classifying them as overweight based on WHO criteria.[24] Kumar et al. found that 50% of hypothyroid cases had a BMI >30 kg/m²,[25] and Singla et al. identified a significant ($p<0.001$) positive correlation between TSH levels and BMI. The association between BMI and thyroid function variations can be attributed to thermogenesis, where thyroid hormones regulate cellular energy production.[26]

In terms of clinical findings, 47% of patients had no specific physical signs, while 13% had pallor, 8% each had dry skin and obesity, 6% had bradycardia, and 5% had pedal edema and goiter. These findings are in line with Sharma et al., who reported that dry skin and weight gain were the most commonly observed symptoms.[16] Madhuvan et al. found that classic hypothyroidism features, such

as dry skin, hoarse voice, and sluggish ankle jerk, were prevalent in elderly subjects, similar to adult populations.[19]

Regarding etiology, the majority (75%) of cases had an undetermined cause, followed by autoimmune etiology (20%), history of antithyroid drug use (3%), and previous thyroid surgery (2%). Halawani et al. identified autoimmune thyroiditis as the leading cause of hypothyroidism, with infections and iodine intake being major environmental factors.[27] Almandoz et al. and Vanderpump et al. also highlighted chronic autoimmune thyroiditis and iodine deficiency as primary contributors to hypothyroidism.[28,29]

Overall, our study confirms the high prevalence of hypothyroidism in elderly females and emphasizes the importance of early diagnosis and management to improve health outcomes.

Conclusion

Hypothyroidism is a prevalent condition among the elderly, often presenting with subtle and nonspecific symptoms that can complicate timely diagnosis and management. Our study highlights the significant burden of hypothyroidism in older adults, with a higher prevalence in females. The most commonly reported symptoms included fatigue, generalized weakness, weight gain, and constipation, while hypertension and diabetes were the most frequent comorbidities. These findings align with existing literature, reinforcing the importance of heightened clinical awareness in geriatric populations.

The study also underscores the role of autoimmune thyroid dysfunction, iodine deficiency, and age-related physiological changes in the pathogenesis of hypothyroidism. Additionally, our findings suggest a link between hypothyroidism and increased BMI, emphasizing the need for weight management strategies in affected individuals. Given the challenges of diagnosing and treating hypothyroidism in older adults, routine screening and individualized management approaches are essential to improving patient outcomes. Future research should focus on long-term outcomes of thyroid hormone therapy in elderly patients and its impact on overall health and quality of life.

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