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## RESEARCH ON CLINICAL GUIDELINES DIAGNOSTIC EVALUATION AND TREATMENT STRATEGIES IN HYPOTHYROIDISM

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### ABSTRACT

**Background:** Hypothyroidism is a relatively common condition in which the thyroid gland fails to produce sufficient hormones. These hormones are significant because they assist in controlling factors such as energy levels, metabolism, and body temperature. **Objective:** To evaluate the diagnostic approaches, treatment strategies, and guideline adherence in the management of hypothyroidism among hospitalized patients. **Methods:** An ambi-directional observational study was conducted on 251 adult inpatients diagnosed with hypothyroidism. Data were collected using a structured questionnaire, including demographic details, clinical presentation, comorbidities, thyroid profile, class of hypothyroidism, imaging, treatment regimen (with levothyroxine), Billewicz scoring, and follow-up monitoring. Inclusion and exclusion criteria were strictly followed to ensure relevance and accuracy. **Results:** Out of 251 patients, 80.9% were female, with the majority (55.8%) aged between 50–69 years. Primary hypothyroidism was the most common class (91%), and 91.26% of patients showed elevated TSH and low T4 levels. Common symptoms included constipation, dry skin, and weight gain, as assessed by Billewicz scoring. The most frequently prescribed current levothyroxine doses were 75 mcg and 50 mcg (each in 27.5% of patients). While 31.9% were newly diagnosed, others had prior treatment, with 25 mcg being the most common past dose. A majority (70.91%) were treated according to ATA guidelines. Co-morbidities included hypertension (38.1%) and type 2 diabetes (28.13%). **Conclusion:** The study highlights a strong female predominance and midlife onset in

hypothyroidism. Rational prescribing patterns were observed, with appropriate levothyroxine dose titration based on hormonal levels and clinical symptoms. High adherence to ATA guidelines indicates evidence-based practice.

**Keywords: Hypothyroidism, Subclinical hypothyroidism, Levothyroxine, Thyroid profile, TSH monitoring**

## INTRODUCTION:

Hypothyroidism is a prevalent endocrine disease caused by reduced secretion of thyroid hormones—triiodothyronine (T3) and thyroxine (T4)—from the thyroid gland. This deficiency causes a generalized slowing of all bodily metabolic processes. It can be separated into overt hypothyroidism, where both TSH is increased and FT4 is decreased, and subclinical hypothyroidism, where TSH is increased but FT4 is in the normal range [1, 2]. The incidence of hypothyroidism is age-related and is very high in women, with autoimmune thyroiditis being the most prevalent etiology in iodine-replete regions [3]. Globally, iodine deficiency continues to play a dominant role in the worldwide burden of hypothyroidism. In the elderly, hypothyroidism usually has nonspecific and subtle symptoms, and early diagnosis is therefore difficult [5, 6]. Hypothyroidism is one of the most frequent endocrine diseases in the world. Its incidence is widely different based on the population under investigation, iodine consumption, age group, and sex. The overall incidence of overt hypothyroidism is estimated at 0.3% to 3.7%, whereas subclinical hypothyroidism can occur in as

many as 10% of the general population [1, 2]. Women are disproportionately impacted with the condition being 5 to 8 times higher in women compared to men [3]. The incidence also rises with advancing age, and studies indicate that elderly women over 60 years are at highest risk of both overt and subclinical hypothyroidism [2, 4].

Hypothyroidism is caused by a variety of conditions that affect the synthesis, secretion, or action of thyroid hormones. Depending on the location of the defect, it is divided into primary, secondary, and tertiary hypothyroidism [1, 2]. Typical features are fatigue, cold intolerance, weight gain, constipation, and dryness of the skin. They result from decreased metabolic rate and impaired thermogenesis. A survey of more than 2,000 patients with overt and subclinical hypothyroidism reported that fatigue (95%), cold intolerance (84%), and weight gain (78%) were the most common symptoms [1].

To make the diagnosis of hypothyroidism, a serum TSH measurement and an estimate (or direct measurement) of free T<sub>4</sub> should be done. When autoimmune thyroiditis is suspected to be

the underlying etiology, it is useful to document antithyroid antibody titers, either anticrosome antibody (anti-TPO antibody) or antithyroglobulin antibody. The antimicrosomal antibody determination is more sensitive and specific. If the TSH value is low, inappropriately normal, or inappropriately not elevated with low T<sub>4</sub> values, central hypothyroidism due to hypothalamic or pituitary disease should be ruled out prior to initiating thyroid replacement treatment. Thyroid function tests derived from sick hospitalized patients should also be interpreted with caution, as serum T<sub>4</sub> and/or TSH can indicate hypothyroidism [14, 15].

## MATERIALS AND METHODS:

**Study Design and Settings:** This was an ambi-directional study conducted in the Department of General Medicine at Mallige Hospital, located at 31/32 Crescent This Road, Madhava Nagar, Gandhi Nagar, Bengaluru, Karnataka. Mallige Hospital is a multispecialty tertiary care hospital situated in the heart of Bengaluru, the capital of Karnataka, India. This study was carried out over a period of 6 months (January to June 2025).

**Study Population:** A total of 251 patients diagnosed with Hypothyroidism and receiving Levothyroxine therapy were included.

### Inclusion Criteria:

- Adults aged more than 18 years.

- Diagnosis based on the cases of primary, secondary or subclinical hypothyroidism.
- Patients currently on Levothyroxine.

### Exclusion Criteria:

- Patients with Hyperthyroidism, thyroid cancer, pregnant and lactating women.
- Patients with incomplete or missing medical records.

**Data Collection:** Patients details were collected from medical case sheets, lab records, and direct patient interviews using a structured data collection form.

The following variables were recorded:

- Demographics: Age, Sex
- Clinical features: based on Billiwicz scoring system (symptoms like constipation, cold intolerance, weight gain etc.)
- Lab findings: Thyroid function tests (TSH, T<sub>4</sub> and T<sub>3</sub>), lipid profile, haemoglobin.
- Type of Hypothyroidism: Primary, Subclinical, Secondary
- Treatment details: Current and past levothyroxine doses, dose titration.
- Guidelines adherence: Evaluated according to American Thyroid Association (ATA), Indian council of Medical Research (ICMR), and Endocrine Society guidelines.

**Statistics:** The data were initially inputted in Microsoft Excel and thereafter analysed through SPSS version 25.0. For the quantitative data, we computed the mean values and their standard deviations to indicate how far apart the numbers were. For groups or categories, we displayed the data in counts and percentages. In comparing various groups, we applied the Chi-square test or t-test, depending on what was suitable. We took any finding with a p-value of less than 0.05 to be statistically significant, i.e., unlikely to occur by chance.

**Ethical Considerations:** This study protocol was approved from the Institutional

Ethics Committee of Mallige Hospital (Approval No: MCP/RRB/017/24-25). Informed consent was obtained from all participants before inclusion.

## RESULTS:

### Demographics Profile:

A total of 251 patients diagnosed with hypothyroidism were included in this study. Among these, 203 (80.9%) were females and 48 (19.1%) were males. The mean age of the patients was  $54.2 \pm 12.7$  years with a majority (42.2%) of patients were in the 50–69 years age category, followed by 30–49 years (32.3%).

Table 1: Age and gender distribution of patients

| Age group           | No. of Subjects | Percentage of subjects |
|---------------------|-----------------|------------------------|
| Newborn to 10 years | 0               | 0 %                    |
| 11 to 18            | 2               | 0.8%                   |
| 19 to 29            | 7               | 2.8%                   |
| 30 to 49            | 60              | 23.9%                  |
| 50 to 69            | 140             | 55.8%                  |
| 70 to 89            | 42              | 16.7%                  |
| More than 90        | 0               | 0%                     |
| Total               | 251             | 100%                   |

| Gender | No. of Subjects | Percentage |
|--------|-----------------|------------|
| Male   | 48              | 19.1 %     |
| Female | 203             | 80.9 %     |

**Clinical Features:** The common symptoms reported were constipation (65.7%), dry skin (52.3%), and weight gain (48.6%). Other symptoms were hair loss (41.0%), cold intolerance (38.2%), lethargy (34.6%), and bradycardia (11.6%). According to the Billewicz scoring system suggestive of hypothyroidism, 72% showed of clinical features consistent of hypothyroidism (Figure 1).

**Biochemical Profile:** Out of 251 patients, 230 (91.26%) had a TSH level greater than  $4.5 \mu\text{IU/mL}$  and a T4 level less than  $0.8 \text{ ng/dL}$ , consistent with a diagnosis of primary hypothyroidism, as shown in Table 10. Additionally, 15 patients (5.95%) had TSH levels below  $4.5 \mu\text{IU/mL}$  and a T4 level of  $0.8 \text{ ng/dL}$ , indicating secondary hypothyroidism. The remaining 6 patients (2.35%) had normal TSH and T4 levels, suggestive of subclinical hypothyroidism (Figure 2).

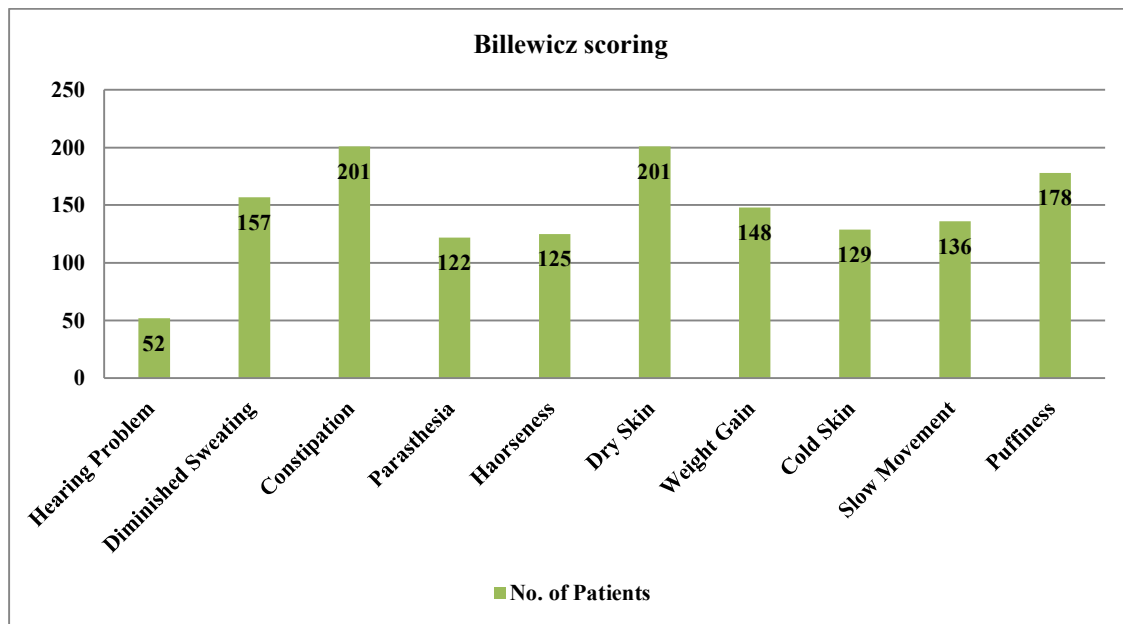


Figure 1: Clinical features of hypothyroidism in study patients

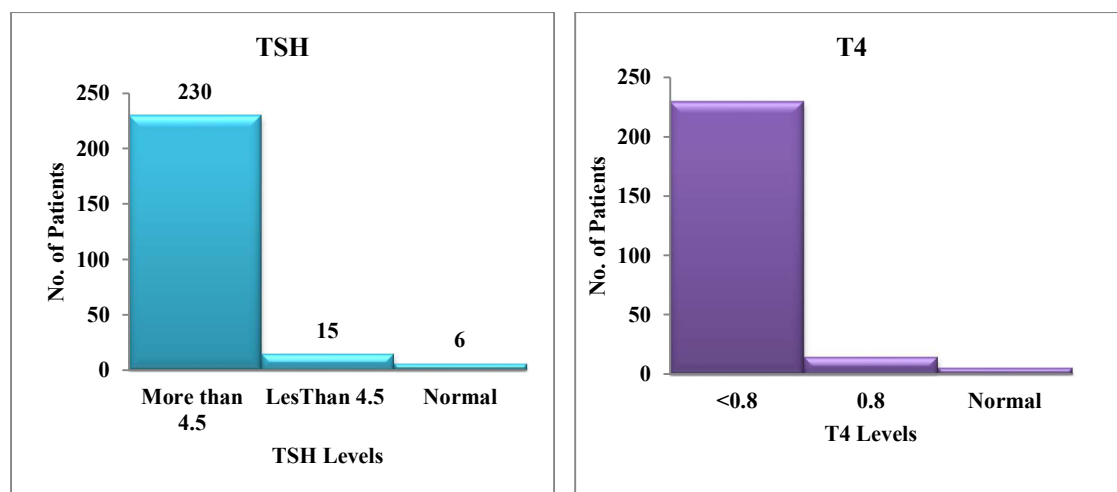


Figure 2: Hormonal Profile Based on TSH and T4 Levels) (TSH- Thyroid Stimulating Hormone, T4-Thyroxine

**Treatment Patterns:** All patients were put on levothyroxine (LT4). The most commonly used doses were 50 mcg/day (27.5%) and 75 mcg/day (27.5%). Doses of 25 mcg/day, were prescribed in 16.7% of patients, whereas 14.8% of patients were taking higher doses (100–150 mcg/day). Six to eight weeks after the initial prescription of LT4 and repeat TSH was requested in 62% of patients for dose titration.

**Guideline Adherence:** Evaluation of treatment practices showed that 70.9% of patients were managed according to the American Thyroid Association (ATA) guidelines, 27.8% according to ICMR guidelines, and 1.2% according to Endocrine Society recommendations. In cases of subclinical hypothyroidism, treatment was initiated selectively, based on TSH levels and presence of symptoms (Figure 4).

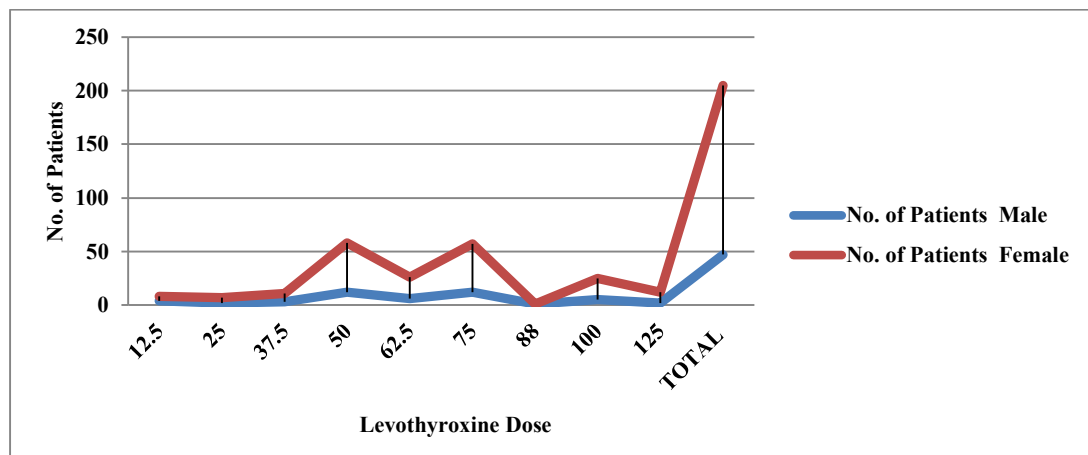


Figure 3: Gender wise Distribution of Levothyroxine Dose

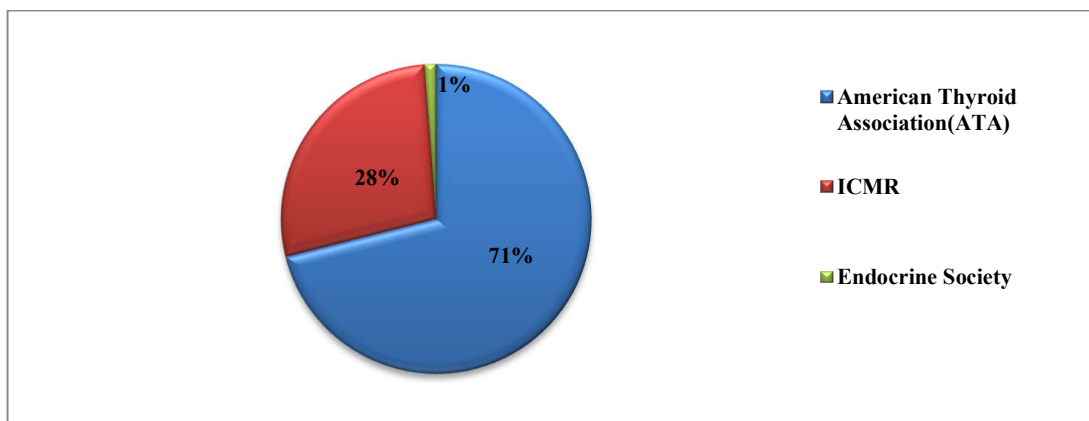


Figure 4: Guideline adherence in hypothyroidism management

## DISCUSSION

This study provides insight into the demographic characteristics, clinical profile, risk factors, and levothyroxine prescribing patterns among patients with hypothyroidism. A total of 251 patients were assessed, with a pronounced female predominance (80.9%), consistent with existing literature that identifies women as more susceptible to thyroid dysfunction, particularly autoimmune hypothyroidism. The majority of patients (55.8%) belonged to the 50–69 years age group, suggesting

that hypothyroidism is more common in middle-aged and elderly populations. This is supported by the well-documented age-related decline in thyroid function [1, 2, 10]. Levothyroxine prescribing patterns reflected standard clinical practice. While 25 mcg was the most common past dose (16.7%), the current most frequently prescribed doses were 75 mcg and 50 mcg (both 27.5%), followed by 62.5 mcg (12.7%). This trend suggests initial cautious dosing with subsequent titration based on hormonal response. Interestingly, 31.9% of patients

had no prior history of levothyroxine use, indicating either new diagnoses or poor follow-up/treatment compliance before hospitalization. The clinical diagnosis was supported using Billewicz scoring, where symptoms such as constipation, dry skin, puffiness, weight gain, and diminished sweating were frequently reported. These symptoms are characteristic of hypothyroidism and indicate the relevance of symptom-based diagnostic tools in conjunction with laboratory assessments [11, 13].

Biochemical data confirmed that the majority (91.26%) had elevated TSH and low T4 levels, indicating primary hypothyroidism. This correlates well with the clinical classification, where 91% of cases were categorized as primary hypothyroidism. A small percentage of subclinical (5.9%) and secondary hypothyroidism (1.95%) cases were also identified. Common risk factors included being female (40%), previous thyroid issues (30%), and advanced age (17%). A range of comorbidities was observed, most notably hypertension (38.1%) and type 2 diabetes mellitus (28.13%). These conditions are known to coexist with thyroid dysfunction and may influence disease severity and therapeutic response. Among the 251 patients, 113 underwent thyroid imaging, with thyroid scanning being more commonly performed than neck ultrasound.

The majority of patients (70.91%) were treated in accordance with American Thyroid Association (ATA) guidelines, reflecting adherence to internationally accepted standards [12].

Overall, the data suggests rational prescribing patterns, appropriate diagnosis, and adherence to clinical guidelines in the management of hypothyroidism. The findings reinforce the importance of individualized dose titration and regular monitoring of TSH and T4 levels to achieve optimal outcomes.

**LIMITATIONS:** This research was done in a single-center environment with a modest sample size and might restrict applicability to larger populations. The absence of long-term follow-up prevented evaluation of the longevities of treatment, dose titration with time, and late patient outcomes. The research did not measure patient adherence to levothyroxine and its effect on treatment efficacy and quality of life. Since it was a retrospective analysis, data collection was only from existing records, and real-time monitoring or patient-reported outcomes were not incorporated. Also, genetic, nutritional, and environmental factors that affect thyroid dysfunction were not addressed, which could have offered a more holistic risk assessment [1-3].

#### **CONCLUSION:**

This study aimed to evaluate diagnostic approaches and treatment patterns in

patients with hypothyroidism. The majority of cases were observed in middle-aged females, with primary hypothyroidism being the most prevalent class. TSH levels and clinical symptoms were consistently used to guide diagnosis and levothyroxine dose titration, with 75 mcg and 50 mcg emerging as the most commonly prescribed doses.

A significant proportion of patients (over 70%) were managed according to the American Thyroid Association (ATA) guidelines, reflecting strong adherence to evidence-based practices. The study highlights the importance of following standard clinical guidelines to ensure accurate diagnosis, rational prescribing, and improved patient outcomes. Early diagnosis, regular hormonal monitoring, and patient education remain the cornerstone of effective hypothyroidism management.

**Strength:** This research incorporated a fairly large inpatient population (n = 251), lending weight to the results. Application of both clinical (Billewicz score) and biochemical assessment provided an overall evaluation of hypothyroidism. Comparison of adherence with more than one guideline (ATA, ICMR, Endocrine Society) offered practical implications for Indian clinical practice. Information was obtained from a tertiary care center, which gives a true reflection of how hypothyroidism is managed in India.

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#### **Author Contributions:**

Concept, design, intellectual content definition, literature search, clinical studies, experimental studies, data acquisition and data analysis were conducted by Sk Jamiluddin, Liya Elza Linsy, Ashhad M R and Varsha K B, Shailesh Yadav. Statistical analysis and manuscript preparation were conducted by Sk Jamiluddin, Liya Elza Linsy, Ashhad M R and Varsha K B.

Manuscript has been read and signed off on by all authors, that the authorship requirements set out hereunder have been fulfilled and that every author feels that the manuscript is honest work.

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