

MEDICATION ADHERENCE IN PATIENTS WITH HYPOTHYROIDISM: A NARRATIVE REVIEW

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Abstract

Introduction: Hypothyroidism is a common condition under the category of Endocrine disorders, necessitating lifelong use of Levothyroxine. It becomes crucial for optimal results for medication adherence to be achieved. Nonetheless, this continues to be one of the significant clinical challenges.

Aim: The study aims to establish the extent of the adherence among patients with hypothyroidism and to determine the major determinants of non-adherence.

Methods: This paper conducts a narrative review of available literature through electronic databases such as PubMed, Google scholar, Research gate, and WHO website. Studies published between 2017 and 2024 were identified based on their relevance to medication adherence in hypothyroidism patients.

Results: Out of eighteen included studies, medication adherence showed a wide variation from as low as 10% up to as high as 89%. The majority of these reports showed moderate medication adherence with a maximum of 30-50% achieving high adherence rates. Key reasons for non adherence included forgetfulness, lack of adequate patient knowledge, inappropriate timing of taking levothyroxine, drug food interaction, long treatment period, and irregular follow-ups among others.

Conclusion: The levels of medication adherence among patients with hypothyroidism remain inadequate. The multifaceted determinants of non-adherence should be considered as an integral part of the patient-centred intervention programs.

KEYWORDS: Hypothyroidism, Medication Adherence, Levothyroxine, Compliance, Thyroid Disorders, Patient Education.

INTRODUCTION

Thyroid gland is a two-lobed, butterfly shaped organ in the anterior part of the neck that has an important role to play in regulating metabolic functions. It is responsible for producing iodinated hormones, thyroxine (T₄) and triiodothyronine (T₃),

which are critical for energy metabolism, body growth and development, and nervous system development. The hormones are produced by follicular cells and require iodine consumption and enzyme activity for their production. Thyroid hormone production is controlled by the hypothalamus-pituitary-thyroid axis via a negative feedback mechanism [1,2]. The etiology of hypothyroidism can be said to include an inadequate production of thyroid hormones or a decrease in the Activity of thyroid hormone at target sites. There have been more people being tested for hypothyroidism because of advances in testing Methods, as well as because more cases of hypothyroidism have been recognized as a problem [3]. Although it is established that hypothyroidism is linked to several other health conditions, data concerning Its effect on all-cause mortality still remains controversial [4]. Typically, the disease is divided into three types: primary (thyroid gland malfunction), secondary (pituitary dysfunction), and tertiary (hypothalamus gland problem). In areas where there is an adequate amount of iodine, the most common cause of primary hypothyroidism is autoimmune thyroiditis, more specifically Hashimoto's thyroiditis [5].

MEDICATION ADHERENCE

Adherence relates to how consistent a patient's adherence to drug intake aligns With recommended guidance from their doctor. In hypothyroidism, adherence to levothyroxine treatment is crucial since even minor changes in dosage timing or skipping of medication lead to major fluctuations in TSH and thyroid hormones, resulting in either hypothyroidism or thyrotoxicosis.

1.11.1METHODS OF ASSESSING MEDICATION ADHERENCE:

Biochemical Markers:

Serum TSH and free thyroxine (fT4) levels serve as indirect but routine biologic proxies for Adherence. Persistently abnormal TSH despite dose adjustments may reflect non adherence, Although confounders such as malabsorption or drug interactions exist. Thus, biochemical Monitoring is useful but insufficient alone for assessing adherence.

Patient-Reported Measures:

Questionnaires such as the Morisky Medication Adherence Scale (MMAS), including its variations such as MMAS-8, have been extensively used due to their ease and reliable validity. MMAS-8 is known for having good internal consistency (Cronbach's $\alpha \approx 0.7$) and is able to classify Adherence into low, moderate, and high groups. Research on hypothyroid patients has revealed moderate adherence using MMAS-8. While self-reporting is prone to Recall Bias and Social Desirability Bias, the tool is still useful, especially when combined with Clinical information.

Pharmacy Refill and Claims Data

Objective measures including the proportion of days covered (PDC) calculated from pharmacy Refill records provide longitudinal adherence estimates. Thresholds such as $PDC \geq 80\%$ Typically delineate adherent behavior, balancing sensitivity and specificity. Large retrospective Analyses confirm that adherence to LT4 remains an issue, and adherence rates differ between Formulations—Synthroid showing higher adherence compared to generics.

Electronic Monitoring and Emerging Technologies

Advanced methods such as electronic pill bottles and mobile health technologies afford real Time medication-taking verification. However, their cost, user acceptability, and Implementation barriers limit routine use. Technology-assisted interventions combining Automated reminders with in-person support suggest promise for improving adherence, though Extrapolation to hypothyroid populations requires further validation.[6]

METHODOLOGY

STUDY DESIGN:

A narrative review study was conducted to understand medication adherence among patients with hypothyroidism

LITERATURE SEARCH STRATEGY:

A comprehensive literature search was carried out using electronic databases such as:

PubMed

Google Scholar

Research gate

WHO

Keywords used included combinations of:

Hypothyroidism

medication adherence

Compliance

Levothyroxine adherence

STUDY PERIOD:

6 months

SELECTION OF STUIDES

Articles were selected based on relevance to medication adherence in hypothyroid patients Study published from July 2017 to August 2024 were selected

Records identified through database searching (n = 54)

Inclusion criteria:

Studies published in English

Studies involving hypothyroid patients

Studies discussing adherence to hypothyroidism treatment

Exclusion criteria:

Studies not focused on medication adherence

Case reports, editorial and letters

Article lacking full text availability or duplicate studies

DATA EXTRACTION

Data were extracted using a structured format that included author name, study design, sample size, medication, adherence measurement tool, adherence rate, and factors associated with non adherence.

Only relevant information reported by the authors was included without modification.

DATA ANALYSIS

Extracted data were summarized narratively and organized into tables to present medication adherence rates and factors associated with non-adherence from each study.

Findings were grouped into patient-related, therapy-related, healthcare system-related, and socioeconomic factors based on what each author reported.

RESULTS

Adherence was assessed in all 18 included studies, using validated measurement tools such as MMAS-8, MMAS-4, MARS-5, BMQ, Morisky-Green 4-item, structured questionnaires, and pharmacy refill-based measures. Across these studies, adherence was the primary outcome. Sample sizes across studies ranged from 104 to 580,331 participants, with the smallest cohort derived from a prospective South Indian study [18] and the largest from the U.S. claims database analysis [14]. Most participants were recruited from outpatient clinics, including endocrine units, general medicine OPDs, community pharmacies, and tertiary-care hospitals [7,9,10,11,13,17,18,19,21,22,23,24]. Three studies sourced participants from large insurance or medical databases, allowing broader assessment of adherence behavior [14,15,20]. In terms of study design, twelve studies were cross-sectional [7,8,11,13,16,17,18,19,21,22,23,24], two prospective observational [9,12], and three were retrospective cohort studies utilizing pharmacy refill data [14,15, 20]. A pre-post interventional trial evaluated pharmacist-led adherence enhancement [10].

6.1. Medication adherence rate

Across the eighteen included studies, adherence to levothyroxine therapy showed substantial variation. Overall adherence from 10 to 89.57%, depending on the population studied and the adherence tool used (7-24). Between 38% and 60% of patients in a number of hospital-based trials took their medications as directed, indicating moderate adherence [7,9,13,18,19,22,23]. Studies using MMAS-8 or BMQ instruments consistently found that only 30-45% of patients achieved high adherence, while 25-55% showed low adherence [8-11,13,16,18,19,22]. In a pediatric cohort with congenital hypothyroidism, 71% demonstrated good adherence [8]. With a mean PDC of 79.6% and 54% categorized as highly adherent, pregnancy-related hypothyroidism demonstrated greater adherence [20].

Liquid levothyroxine formulations demonstrated better timing adherence compared to tablets, with 87% of users showing good adherence [18]. Only 39% of patients in a Belgian community research took levothyroxine appropriately on an empty stomach, despite the fact that most patients adhered to their prescriptions [24]. A few studies reported very high adherence, such as 89.57% in an Indian cohort assessed using MARS-5 [23]. Synthesizing the evidence from all eighteen articles, approximately half of hypothyroid patients struggle with consistent levothyroxine use, regardless of region or setting [7-24].

TABLE 1: MEASUREMENT OF MEDICATION ADHERENCE RATE

S.no	Author	Study design	Sample size	Medication	Measurement tool and score	Result	Adherence percentage
1	Shakyashrestha et al., 2018	Cross sectional study	113	Levothyroxine	Structured questionnaire Adherent = missed < 2 doses Non adherent = missed > 2 doses	Adherent	51.3
2	Manjula et al., 2020	Prospective observational study	450	Levothyroxine	MMAS-8 Good = 8 Medium = 6 to 7 low = <6	Adherent good medium low	44 25.9 30
3	Mariam et al., 2022	Interventional (pre post) study	150	Levothyroxine	MMAS-8	Pretest adherence High	17.3

						Medium Low Post test adherence High Medium low	40.7 42 48.7 30.7 20.7
4	Kumar &shaukat, 2019	Cross sectional	289	Levothyroxine	MMAS-8 High=8 Medium=6- <8 Low=<6	Adherence High Medium low	32.3 40.48 27.3
5	Yarahmand i et al., 2024	National cross sectional study	400	Levothyroxine	MMAS-8 High=8 Moderate =6- <8 Low=<6	Adherence High Medium Low	20.5 50.5 29
6	Rahma Mohamed al kindi et al., 2023	National multi centre cross sectional study	400	Levothyroxine	MMAS-8 High =8 Medium= 6 to 7 low = <6	Adherent High Medium Low	26 34.8 39.2
7	Zsolthepp et al.,2018	Retrospective claims database analysis	580,331	Levothyroxine	PDC >80%= Adherent <80%=non adherent	Adherent 6month 12 month Highest adherence for synthroid	59.7 48.1 64
8	Rasha m. Alofi et al.2023	Cross-sectional	420	Levothyroxine	MMAS-8 SCORE 0-8 HIGH=8 MODERATE=6-7 LOW=<6	Adherent High Moderate low	10 23.3 66.7
9	Hepp z.,lagem.j.,espailla.,t., 2018	Retrospective cohort study using market scan u.s. claims data base	366,918	Levothyroxine	PDC Adherent= PDC>80% Non adherent=PDC<80%	Adherent	45.92
10	Sarah elhelou et al.,2019	Cross-sectional	337	Levothyroxine	Self reported score (0-100%)	Adherent	14.5 30.6

		(pharmacy based)			High $\geq$ 80% Medium 60-79 Low $\leq$ 60%	High Medium Low	54.9
11	Carlo cappelli et al.,2018	Observational cross-sectional study	320	Levothyroxine	MMAS-8 High $\geq$ 8 Medium 6-7 Low $<$ 6	Adherent High Medium Low	87.2 10.9 1.9
12	Keerthianavarapu et al.,2022	Prospective cross sectional study	208(104 hypothyroid)	Levothyroxine	MMAS-8 BMQ 3 screens were used	Adherence High Medium Low Regimen screen Belief screen Recall screen	34.6 36.5 28.8 40.4 57.3 43.3
13	Julia siscart et al., 2017	Retrospective observational cohort	17,281	Levothyroxine	PDC High $>$ 80% Medium50-80% Low $<$ 50%	Adherence High Medium Low	54 32.9 13
14	Anneesha mohan et al., 2017	Cross sectional descriptive	162	Levothyroxine	MMAS-4 High =4 Medium = 2-3 Low $<$ 2	Adherent High Medium Low	38.27 43.83 17.9
15	Savaskaratas& yalcinhaci oglu., 2022	Cross sectional analytics	162	Levothyroxine	MMAS-8(Turkish version) High/medium $\geq$ 6 Low $<$ 6	Adherent high/ medium low	57.4 42.6
16	Mehuys et al., 2023	Cross sectional community pharmacy study	856	Levothyroxine	MPR Adherent = $\geq$ 80% Non adherent = $<$ 25 MARS-5 Adherent= 25 Non adherent= $<$ 25	Adherent Adherent	71.8 75.2
17	Machado et al., 2020	Observational follow up study	338	Levothyroxine	Morisky green 4-item High Adherent = 0 Moderate adherent = 1-2 Low adherent = $\geq$ 3	Adherent High Moderate Low	85.8 8.8 5.4
18	Poojary et al., 2023	Cross sectional	188 (163 hypot)	Levothyroxine	MARS-5 Adherent = $\geq$ 20	Adherent	89.57

		observational study	thyroid)				
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6.2 Factors Associated With Non-Adherence

The determinants of non-adherence varied across studies but showed consistent patterns across the fourteen sources.

Patient-related factors were the most prevalent contributors to non-adherence. Forgetfulness was repeatedly identified as the leading cause [7,9,10,19]. Younger age groups, irregular routines, and lower health literacy were also associated with missed doses [16,17,21]. Insufficient understanding of hypothyroidism and poor knowledge of levothyroxine timing requirements strongly predicted lower adherence [11,13]. In congenital hypothyroidism, lower maternal education negatively affected adherence [8].

Therapy-related factors played a significant role. Levothyroxine's strict administration requirements-taking the dose on an empty stomach and spacing it away from interacting substances-were commonly violated [18,24]. Co-administration with interacting medications such as calcium, iron, or proton-pump inhibitors was frequently reported and correlated with lower adherence [7,22,24]. Studies found that liquid formulations improved adherence due to easier administration [18].

Socioeconomic influences-such as lower paternal education, rural residence, high cost of medicine and low income-were linked with reduced adherence in many studies [7-9,17]. Lack of family support or living alone further contributed to inconsistent medication use [13].

Health-system factors included limited counselling, missed follow-up appointments, and infrequent TSH monitoring, all of which were strongly associated with non-adherence [7,9,11,12,16,17]. Patients receiving structured counselling or regular pharmacist support demonstrated higher adherence levels [10].

Generally, the most common reasons for non-adherence among fourteen different studies include forgetting to take the medication, lack of adequate information, problems with the time and diet, polypharmacy, and no routine follow-up.

TABLE 2: FACTORS ASSOCIATED WITH NON-ADHERENCE

S.no	Author	Patient related factor	Therapy related factor	Healthcare system related factor	Socioeconomic factor
1	Shakyashrestha et al.,2018	Forgetfulness. Busy work schedule. Symptomatic relief →stopping medicine. Switching to Ayurvedic/ alternative medicine. Stress Lost medicine. Travelling Household responsibilities. Treatment	Side effects (gastritis). Concern about taking medicine during certain conditions	Missed follow up appointments. Lack of adequate counseling . Poor patient provider relationship	Earthquake disrupting Treatment. Financial constraints (implied through refill gaps)

		fatigue (long duration)			
2	Manjula et al., 2020	Forgetfulness (42%) Ignorance Symptomrelief discontinuation	Side effects (4.7%). Complex regimen. Doubtful efficacy	Limited awareness from healthcare staff (reported indirectly)	High cost (31.3%)
3	Mariam et al., 2022	Forgetfulness (most common) Feeling better →stopping dose • Life stress. Busy lifestyle	Pill burden / complexity	Lack of pre intervention counselling Irregular physician visits	Medication affordability issues. Poor accessibility to medicine
4	Kumar &shaukat, et al., 2019	Need assistance to take medication. Avoiding medicine with symptomatic relief. Busy work schedule Low knowledge aboutDisease. Low knowledge about medicine	Side effects	Irregular endocrinologist visits • Lack of counselling about disease. Lack of counselling about medication	Medication affordability issues. Difficulty accessing medicine
5	Yarahmandi et al., 2024	Caregiver burden. Difficulty administering levothyroxine to infants. Low parental understanding of treatment			Low parental education Socioeconomic status differences by province. Access challenges in some regions
6	Rahma Mohamed al kindi et al.,2023	Lack of awareness about hypothyroidism and importance of maintaining euthyroid state (from discussion)			
7	Zsolthepp et al., 2018		Variation in adherence between different LT4 formulations		

			(patients less adherent to Tirosint/Unithroid vs Synthroid)		
8	Rasha m. Alofi et al. 2023	Younger age groups had significantly lower adherence; needing assistance to take medicine lowered adherence	Shorter duration of LT4 use associated with lower adherence	Shorter duration of LT4 use associated with lower adherence	
9	Sarah elhelou et al., 2019	Older age increased adherence (thus younger age = lower adherence); having 1 or 2+ comorbidities reduced adherence; postponing or cancelling medical appointments lowered adherence		Lack of physician explanation about disease decreased adherence; irregular endocrinology follow-up decreased adherence	Lower monthly income associated with reduced adherence; Number of alcohol drinks/week & waterpipe smoking/week decreased adherence
10	Carlo cappelli et al., 2018	Patients on tablet LT4 forgot doses more often, felt hassled, and had difficulty remembering (MMAS-8 items showed more non-adherence with tablets).	Tablet formulation associated with more forgetfulness and inconvenience than liquid LT4.		
11	Keerthiannava r apuet al., 2019	Low adherence linked to concerns beliefs and forgetfulness			

12	Anneeshamoh an et al.,2017	Low knowledge scores, attitude towards therapy, and lower adherence among younger patients		Patient-doctor relationship	
13	Savaskaratas& yalcinhacioglu., 2022	Low adherence group had anti TPO and anti TG levels; authors note age influenced treatment success			
14	Macha do et al., 2020	Lower adherence among elderly	Moderate/low adherence linked to LT-4 dosing frequency pattern	Not attending follow-ups/ irregular monitorings	

DISCUSSION

Narrative review was conducted to gather findings from 18 studies published from 2017 through 2024 on adherence patterns in hypothyroidism patients undergoing LT4 treatment. The discussion below highlights similarities and differences in findings between these studies and sheds light on important knowledge gaps in this field.

1. Wide Variation in Adherence Rates Across Studies

Another interesting aspect of this review is that adherence levels vary from very low adherence, such as 10% (Alofi et al., 2023), to quite high adherence levels, such as 89.57% (Poojary et al., 2023). The wide gap of this range makes comparisons across different studies difficult; however, it also demonstrates the fact that medication adherence among patients with hypothyroidism is not a homogeneous issue around the globe. Studies from South Asia and the Middle East (Kumar & Shaukat, 2019; El Helou et al., 2019; Alofi et al., 2023) consistently reported lower adherence rates compared to studies from Europe and Australia. For instance, while Cappelli et al. (2018) While reported adherence rates ranged from 70% to 89% in other populations, an Italian population had an adherence rate of 87.2%, according to one study; only 14.5% had high adherence rates in Lebanon, according to El Helou et al. (2019), and 10% of patients in Saudi Arabia showed high adherence levels, according to another report. One interesting example would be that of Poojary et al. (2023) where MARS-5 was used (89.57%), compared to Alofi et al. (2023) where MMAS-8 was utilized (10% high adherence). The striking differences seen here illustrate how greatly the choice of measurement tool impacts outcomes, as will be discussed later.

2. Measurement Tool Influences Reported Adherence

An important finding regarding methodology from the literature review is the inconsistent use of adherence measurement instruments in each study. The Morisky Medication Adherence Scale-8 (MMAS-8) was employed in most of the studies (Shakya Shrestha et al., 2018; Manjula et al., 2020; Mariam et al., 2022; Kumar & Shaukat, 2019; Alofi et al., 2023; Cappelli et al., 2018; Annavarapu et al., 2019), while other studies employed MARS-5 (Poojary et al., 2023; Mehuys et al., 2023), Medication Adherence Questionnaire (Bocale et al., 2022), Proportion of Days Covered (PDC) from claims data (Hepp et al., 2018; Siscart et al., 2022), self-reported scoring (El Helou et al., 2019), and a structured questionnaire (Shakya Shrestha et al., 2018). MARS-5, which focuses on intentional non-adherence and is arguably less punitive in scoring, yielded among the highest adherence rates (71.8–89.57%). In contrast, PDC-based analyses from large US claims databases (Hepp et al., 2018) returned moderate rates of 45.92–64%, reflecting pill refill patterns rather than self-reported behavior. This heterogeneity in methodology constitutes an important limitation in the existing body of knowledge because it prevents any accurate definition of a global benchmark for adherence to LT4 treatment. Future studies need to adopt a standardized measure of disease-specific adherence to allow for cross comparability.

3. Forgetfulness and Symptom-Based Dose Skipping Are Universal Barriers

Regardless of the methodology used, forgetfulness is one of the major barriers to adherence among patients across almost all the included studies. For instance, Shakya Shrestha et al. (2018), Manjula et al. (2020), Mariam et al. (2022), Cappelli et al. (2018), and Annavarapu et al. (2019) all point to forgetfulness as the leading cause of missing doses. Importantly, Cappelli et al. (2018) found that forgetfulness was more frequent among patients taking tablets than those using liquids, indicating that the effort required to adhere to the timing requirements (30–60 minutes before meals) for tablets makes this an important barrier to adherence. Skipping medication based on symptoms—where patients discontinue treatment when feeling well—was observed by Shakya Shrestha et al. (2018), Manjula et al. (2020), Mariam et al. (2022), and Kumar & Shaukat (2019). It highlights the serious lack of knowledge in the sense that there is no awareness on the part of the patient about the long-term nature of hypothyroidism and the fact that symptom remission doesn't equate to cure. In its recognition of chronic disease non-adherence as a major public health issue, the WHO has noted this type of behavior as being in line with trends observed elsewhere in the world. It is evident from the analysis above that there is a need to explore in depth the proportion attributable to forgetfulness as compared to intentional non-compliance and structural factors in overall non-adherence.

4. Liquid Levothyroxine Demonstrates Superior Adherence Over Tablets

This was confirmed by Cappelli et al. (2018) who found in their MMAS-8 analysis that those using the tablets forgot more often to take their dose, felt harassed by the dosage regime, and had problems with remembering the medication compared to those using the liquid preparation. Such observations are clinically relevant because the liquid levothyroxine does not require the patient to follow a strict fasting regime before taking the medication and can be useful for individuals with absorption problems in the digestive tract. Yet, there is an urgent need to address the gap in knowledge since both these studies were performed on a limited number of participants at individual Italian healthcare facilities.

5. Brand Variation Among Tablet Formulations Also Affects Adherence

Using a claims database from the USA of more than 580,000 patients, Hepp et al. (2018) discovered that adherence was highly dependent on the brand of LT4 administered to the patients. The highest adherence rate at 12 months (PDC) for Synthroid (64%) was noted relative to the brands of Tirosint and Unithroid. This presents an aspect that has not been considered before: not only the form of LT4 (solution or pill) but the actual brand, which could be associated with other aspects such as number of pills, packaging, accessibility, trust, and insurance.

6. Pharmacist-Led Counseling Produces the Strongest Adherence Improvement

Among the intervention-based studies, Mariam et al. (2022) further reinforced this in their pre-post interventional study of 150 patients, where pharmacist-led community intervention shifted the proportion of high adherence patients from 17.3% at baseline to 48.7% post intervention. Despite this evidence, pharmacist involvement in hypothyroidism management remains underutilized globally. El Helou et al. (2019) reported that in Lebanon, pharmacist involvement was identified as a key factor improving adherence — yet structural barriers prevented its consistent implementation. This discrepancy is an important systemic flaw. There should be consideration for the integration of pharmacist chronic disease counseling within thyroid treatment guidelines, especially in resource-poor areas where access to endocrinologists is limited.

7. Healthcare System Gaps Consistently Linked to Non-Adherence

Healthcare system-related factors emerged from several studies as important determinants of non-adherence. Infrequent visits to an endocrinologist, insufficient counseling of patients regarding their illness and medication, and ineffective communication between doctors and patients were mentioned by Shakya Shrestha et al. (2018), Kumar & Shaukat (2019), El Helou et al. (2019), Mariam et al. (2022), Alofi et al. (2023), and Machado et al. (2020).

El Helou et al. (2019) A particularly noteworthy finding from their research was that only 59% of the study population knew the fact that iodine is required for thyroid hormone production. This points out that education regarding the disease pathophysiology is completely lacking during counseling in such scenarios. Another interesting finding was reported by Ahlam J. Alhemedi (2024) from Jordan, in which the researcher stated that communication between patients and doctors was one of the most important factors affecting adherence. Another area that needs to be addressed in the field is that of digital health. There was no study reported in the current literature that assessed the effectiveness of mobile health apps, SMS follow-ups, and telemedicine services in adherence to treatment among hypothyroid patients.

8. Socioeconomic Factors Were Region-Specific and Underreported

Socioeconomic factors impacting adherence were found to vary based on geographic regions. The cost factor is one of the main barriers affecting adherence in South Asia-based research studies. For instance, according to Manjula et al. (2020), drug costs contributed to nonadherence in 31.3% of patients from India. Similarly, both Mariam et al. (2022) and Kumar & Shaukat (2019) mentioned affordability and access to medications as barriers. However, the Lebanese cohort, per El Helou et al. (2019), had different factors related to socioeconomic status and lifestyle habits that inversely predicted adherence. The Iranian national cross-sectional study conducted by Yarahmandi et al. (2024) on children with congenital hypothyroidism demonstrated substantial differences in barriers to medication access across provinces, with parental education and socioeconomic

background being among the most significant adherence predictors. Such a pediatric focus is completely missing in any other piece of literature – in fact, the entire topic is not covered by many articles at all, as they concentrate on adults.

9. Age as a Bidirectional Predictor of Adherence

Several studies examined the role of age in medication adherence, yielding complex and sometimes contradictory results. El Helou et al. (2019) and Alofi et al. (2023) both found that younger age groups were associated with significantly lower adherence. Anneeshamohan et al. (2017) confirmed lower adherence among younger patients, linking it to lower knowledge scores and less favorable attitudes toward therapy. In contrast, Machado et al. (2020) found lower adherence among elderly patients, potentially related to polypharmacy, cognitive decline, and the complexity of LT4 dosing requirements. Ahlam J. Alhemedi (2024) group had reported maximum adherence among the age groups of 31 to 50 years of married patients. This indicates that people at this stage have the ability to manage their diseases with more efficacy because of their middle-aged status and availability of supportive structures. It is therefore evident that more adherence studies are needed based on age groups.

CONCLUSION

Most of the studies have reported a range of low to moderate compliance rates in therapy, especially to levothyroxine treatment. This narrative review, summarizing information obtained from eighteen articles, demonstrates that non-adherence to prescribed drugs among hypothyroidism patients is a global issue. Indeed, while levothyroxine is easy to take, highly efficacious, and administered only once per day, compliance rates in this regard are highly influenced by a large variety of factors related to patient characteristics (forgetfulness, low level of understanding, dose omission based on symptoms), features of the treatment regimen itself (administration time, potential adverse effects), health care services provided, and social economic status. Poor adherence to therapy has been consistently proven in many papers to be associated with metabolic instability, high TSH levels, persistence of symptoms, and reduced effectiveness of the treatment. More importantly, interventional studies demonstrate a significant positive effect of patient education, pharmacist intervention, improved physician patient relationship, and adherence assessment techniques on treatment compliance and outcomes.

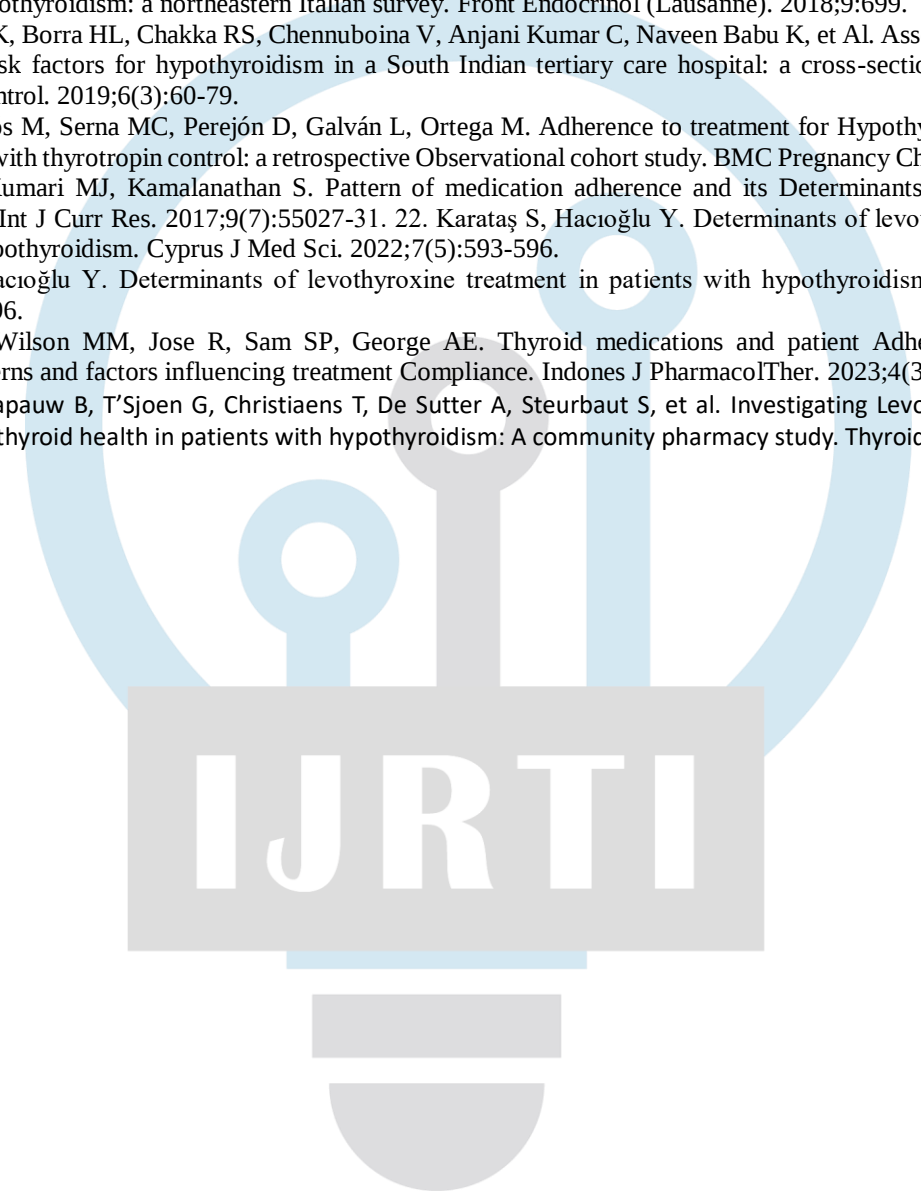
LIMITATION OF THE STUDY

- ☐ Fewer number of research studies were found
- ☐ Difference in instrument used to measure adherence
- ☐ Inaccuracy of self-reported information
- ☐ Difference in population between studies
- ☐ Less focus on clinical outcomes
- ☐ Lack of experiments or randomized studies
- ☐ The literature search was done only for levothyroxine and not for liothyronine (T3).

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