

Clinical Evidence on Ayurvedic Interventions for Hypothyroidism and Subclinical Hypothyroidism: A Scoping Review

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ABSTRACT:

Background: Hypothyroidism is a prevalent endocrine disorder which has a significant clinical burden. The conventional levothyroxine therapy spans over a lifetime and symptoms may continue even after achieving biochemical remission. Ayurveda offers a holistic, integrative approach and can help overcome these limitations. **Objectives:** To systematically map existing evidence about the scope, range and type of clinical evidences **Methods:** Clinical studies conducted among adult persons (≥ 18 years) with hypothyroidism or subclinical hypothyroidism, evaluating any Ayurvedic intervention were eligible. Included study designs were randomized controlled trials (RCT's), quasi-experimental studies, single-arm trial, and case reports with inclusion limited English language publications from January 2015 to December 2025. Medline (via PubMed), Scopus, Web of Science, Cochrane CENTRAL and Clinical trials registry of India. Final search was conducted on 31st December 2025. Data was collected using predefined and pilot tested charting form. Information on study characteristics, interventions, follow-ups studies duration and studies outcomes. Owing to heterogeneity of the included studies, findings were synthesized descriptively. **Results:** Fourteen studies were included: four RCT's, three single-arm trials and seven case reports/series. Interventions comprise the use of single herbs, multi-herbal formulations, Herbo-mineral preparations, different Panchakarma procedures like *Basti*, and all-inclusive approaches combine diet and lifestyle management. Majority reported reduction in serum TSH levels apart from improvement in clinical symptoms, anthropometric parameters and quality of life. RCT's provided comparatively better evidence mainly for all-inclusive approaches. Case-based evidence showed normalization of thyroid function and in one case, supervised withdrawal of levothyroxine. However, the studies were heterogeneous with several methodological constraints. **Conclusions:** Current clinical evidence suggests that Ayurveda interventions may have supportive role as adjuvant and integrative approach in hypothyroidism. Findings suggest consistent clinical benefits but several gaps exist. Well-designed, multi-centric RCTs involving standardized procedures and longer follow-ups are required to ascertain effectiveness and to increase generalizability.

KEYWORDS: Ayurveda, Hypothyroidism, Subclinical hypothyroidism, Scoping review

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1. INTRODUCTION

Hypothyroidism is a deficiency of thyroid hormone secretion and action. It can be categorized as either primary hypothyroidism, which is brought on by a problem with thyroid gland itself, or secondary (central) hypothyroidism, which is brought on by problems with the hypothalamus and pituitary gland, which interferes with the secretion of TSH. Subclinical Hypothyroidism is a mild form of primary hypothyroidism, in which serum free thyroxine (T4) and triiodothyronine (T3) concentrations are within the reference range, but the level of thyroid-stimulating hormone (TSH) is elevated. [1] It is one of the most prevalent endocrine disorders with male female ratio of 1:6. [2] In developed nation, 4-5% of people have hypothyroidism, while subclinical Hypothyroidism affects 4-15% of those populations. In India, over 42 million people have the condition, where the overall prevalence stands at 10.95%. [3]

Clinical manifestations of hypothyroidism involve multiple organs systems which include tiredness or low energy, unexplained increased in weight, unable to tolerate cold, dry and rough skin, difficulty with bowel movements, hair fall, menstrual irregularities, cognitive slowing and depression. Levothyroxine monotherapy has been the standard of care since 1970s. [4] Several studies have demonstrated a link exists between prolonged use of levothyroxine treatment and potential adverse outcomes, including higher risk of heart disease, bone thinning (osteoporosis), and fractures. Furthermore, lifelong long-term therapy has the potential to contribute to economic burden, particularly in the context of rising health care costs. However, while it remains the standard of care and is undoubtedly an effective treatment for hypothyroidism, there remain several challenges that have not yet been addressed. Some patients still have persistent, unresolved symptoms of hypothyroidism in spite of biochemical normalization. Being on a medication for the rest of your life means to some extent living with a physical or mental state that's not completely your own. The mental load is as

great as the financial one. [5, 6] This creates the need for exploration of complementary and integrative approaches in selected patients.

Although increasing number of clinical studies investigated Ayurvedic interventions for hypothyroidism and subclinical hypothyroidism but existing evidence remains scattered regarding different study designs and therapeutic approaches. Currently, no scoping review orderly mapped and synthesized present clinical evidence in the ayurveda field. This scoping review sought to address the following review question: "What is the extent, range and nature of available clinical evidence regarding Ayurvedic interventions for hypothyroidism and subclinical hypothyroidism in adults?"

Objectives: The objectives of this scoping review were: 1. To systematically map the available clinical evidence regarding Ayurvedic interventions for hypothyroidism and subclinical hypothyroidism. 2. To identify the range and types of Ayurvedic interventions evaluated in clinical studies. 3. To summarize reported biochemical, clinical and quality of life outcomes. 4. To identify existing research gaps and priorities for future research. A scoping review approach seemed appropriate given novel, heterogeneous and methodological diverse nature of existing evidence.

2. METHODS

Reporting Standards: This scoping review followed the PRISMA extension for scoping Review (PRISMA-ScR) for protocol and registration. The methodological framework for current scoping review was informed by framework proposed by Arksey and O'Malley and also further guided by Joanna Briggs Institute (JBI) methodology for scoping reviews. A scoping review methodology was chosen because the data which is available on Ayurvedic interventions for hypothyroidism and subclinical hypothyroidism is heterogeneous, with respect to study designs, interventions, outcome measures and reporting standards. The objective was to map the all-clinical evidence and to identify research gaps rather than to evaluate treatment efficacy. A review protocol was

developed by the review team before commencement of the study to guide the review process, including eligibility criteria, search strategy, study selection, and data charting procedures. However, the protocol was not prospectively registered in PROSPERO, Open Science Framework (OSF), or any other publicly accessible repository. Therefore, no registration number, DOI, or publicly available protocol link is available. The review was conducted according to the predefined internal protocol and in accordance with the PRISMA Extension for Scoping Reviews (PRISMA-ScR) and Joanna Briggs Institute (JBI) methodological guidance.

Review Question and PCC Framework: The review question was developed according to the Joanna Briggs Institute (JBI) guidance for scoping reviews using the Population-Concept-Context (PCC) framework.

Population (P): Population: Adults aged 18 years or older diagnosed with hypothyroidism or subclinical hypothyroidism.

Concept (C): Ayurvedic interventions including single-herb therapies, polyherbal formulations, herbo-mineral preparations, *panchkarma*, lifestyle modification, *yoga* and integrative Ayurveda approached.

Context (C): Clinical management of hypothyroidism and subclinical hypothyroidism in any healthcare setting.

Eligibility Criteria: Studies that enrolled patients aged 18 years or older suffering from hypothyroidism or subclinical hypothyroidism taking any Ayurvedic treatment were eligible for inclusion criteria. RCT's, quasi-experimental studies, single-arm clinical trials, case series ($n \geq 3$), and case reports were eligible study designs. Only English language studies included from January 2015 to 31st December 2025. Animal studies, review articles, use of traditional intervention other than ayurvedic, condition like hyperthyroidism, grey literatures and those where data is unavailable in analyzable form was excluded. Because the objective of this scoping review was to comprehensively map the extent, range and varieties of treatment and Ayurvedic intervention available for hypothyroidism and subclinical hypothyroidism, multiple studies including

randomized controlled trials, single-arm clinical studies, case series and case report were considered eligible. Inclusion of diverse study designs enabled identification of emerging evidence, therapeutic approaches and research gaps within this evolving field.

Data Sources: PubMed, Scopus, Web of Science, Cochrane CENTRAL, and Clinical Trials Registry of India (CTRI) were searched from January 2015 to December 2025. Final literature search across all databases was conducted on 31st December 2025. There was no hand- searching or contact with authors and only electronic database were performed. No additional manual searching, citation tracking, grey literature searching or dissertation searching was performed.

Search Strategy: A comprehensive search strategy was developed using combinations of controlled vocabulary terms and free-text keywords related to "Ayurveda," "Ayurvedic medicine," "hypothyroidism," and "subclinical hypothyroidism." The search strategy was adapted appropriately for each database according to its indexing system and search interface. The search strategy was consisted of intervention related terms (Ayurveda, Ayurveda Medicine, Ayurvedic Treatment) AND condition related terms (Hypothyroidism, Thyroid Disorders, Underactive Thyroid) using Boolean operators (AND and OR). Medical subject headings (MeSH) and free text keywords was adapted for each database. A sample search strategy in PubMed was ("Ayurveda" [All Fields] OR "Ayurvedic Medicine" [All Fields] OR "Ayurvedic Treatment" [All Fields]) AND ("Hypothyroidism" [All Fields] OR "Thyroid Disorders" [All Fields] OR "Thyroid Dysfunction" [All Fields]) Filters: English language, Humans, Publication date from 10 years. (Table 1) The search strategy combined terms related to the condition of interest (hypothyroidism OR subclinical hypothyroidism) with terms related to the intervention of interest (Ayurveda OR Ayurvedic OR Panchakarma OR Ayurvedic medicine) using Boolean operators (AND/OR) as appropriate for each database.

Table 1: Search Strategy for Relevant Literature Identification

Database	Search Strategy	Filters Applied	Results Retrieved	Notes
PubMed	("Ayurveda" OR "Ayurvedic Medicine" OR "Ayurvedic Treatment") AND ("Hypothyroidism" OR "Thyroid Disorders" OR "Thyroid Dysfunction")	English language; Humans; Publication date: last 10 years	54	Search conducted using MeSH terms and free - text keywords
Scopus	("Ayurveda" OR "Ayurvedic Medicine" OR "Ayurvedic Treatment") AND ("Hypothyroidism" OR "Thyroid Disorders")	TITLE- ABS- KEY; Article type: Clinical trial/RCT/Case report/Case series; Language: English	178	Search tailored to Scopus indexing fields
Cochrane CENTRAL	("Ayurveda" OR "Ayurvedic Medicine" OR "Ayurvedic Treatment") AND ("Hypothyroidism" OR "Thyroid Disorders")	Trials filter; Language: English	78	Search conducted across titles, abstracts, and keywords

Selection of Sources of Evidence: Retrieved records were screened independently by two reviewers in two-stages (title/abstract then full text). Disagreements between reviewers were resolved through consensus-based discussion.

Data management: Data were charted using a predefined and pilot-tested data extraction form. Data independently extracted by the reviewer data and data was cross-checked for its accuracy.

Data Items: Data extracted included the study characteristics (author, year, country, study design) participant characteristics (sample size, age, sex, diagnosis), type of Ayurvedic intervention, duration of intervention, outcome measures (TSH, T3, T4, symptom scores, quality of life) and main findings. To ensure consistency in data charting and synthesis, operational definitions were established for major variables: 1. Intervention Categories: a). Single-herb interventions were defined as studies evaluating one medicinal plant as the primary therapeutic intervention. b). Polyherbal formulations were defined as preparations containing two or more herbal ingredients. c). Herbo-mineral formulations were defined as Ayurvedic formulations containing herbal and mineral components. d) Panchakarma interventions were defined as classical Ayurvedic purification procedures including *Basti*, *Vamana*, *Virechana*, *Nasya* and related procedures. e). Whole-system or integrative Ayurveda interventions were defined as

protocols combining pharmacological treatment with dietary recommendations, lifestyle modification, yoga, counselling, or Panchakarma procedures. 2. Outcome Measures: Biochemical outcomes included serum thyroid stimulating hormone (TSH), triiodothyronine (T3), thyroxine (T4), free T3, free T4, anti-thyroid peroxidase antibodies (anti-TPO), and other laboratory markers when reported. 3. Quality-of-Life Outcomes: Quality-of-life outcomes were defined as patient-reported measures assessing physical, psychological, social, or overall wellbeing using validated instruments such as WHOQOL-BREF or similar scales reported by included studies. 4. Safety Outcomes: Safety outcomes included adverse events, treatment-related complications, laboratory abnormalities, participant withdrawals due to adverse effects, and any other safety-related observations reported by study authors.

Data Charting: Data were charted through predefined and pilot tested data extraction form which was prepared by review team. Form was initially tested on small number of eligible studies and later refined before formal data extraction. 2 reviewers independently extracted and cross-checked data for its accuracy as well as consistency. Any disagreements during charting process were resolved through discussion and consensus. Attempts to contact study authors for missing information were not undertaken during process. Variables were extracted from each included study: bibliographic information (author, year of

publication and country), study characteristics (study design and sample size), participant characteristics (age, sex and diagnosis), details of Ayurvedic intervention, comparator or intervention group where ever applicable, duration of treatment as well as follow-up, outcome measures assessed, main biochemical outcomes (TSH, T3, T4, FT3, FT4, and anti-TPO), clinical outcomes and symptom scores, quality-of-life outcomes, anthropometric outcomes, adverse events and safety outcomes and key conclusions reported by the study authors. The complete data-charting template is provided in Supplementary table S1.

Quality Appraisal of Inclusion Evidence: No official risk of bias assessment or methodological top-quality appraisal was adopted, as the aim of this article was to combine the present data rather than limiting inclusion based on methodological rigor or generating summary estimates. Therefore, findings are presented as a descriptive synthesis of the available literature and should not be interpreted as a formal assessment of intervention effectiveness.

Summary of Findings: To examine the data the researches integrated the searching's for descriptively, categorizing the researches based upon the intervention, research study design, as well as reported outcomes. The searching's for existed utilizing both aggregation as well as narrative synthesis to find or to identify patterns, inconsistencies together with gaps in the existing research study.

3. RESULT

Search Results: Overall, 310 articles were identified by searching database (PubMed, Scopus, Cochrane CENTRAL, CTRI). After removing 112 duplicates, 198 records were screened based on the titles and abstracts. Of these, a total of 156 records were excluded on the grounds of irrelevant topics, non-Ayurvedic interventions, and nonclinical study designs (e.g., review). The 42 full-text articles follow eligibility assessment. Of these, 28 were excluded in view of insufficient outcome data, study design that failed eligibility criteria, or unclear interventions. Ultimately, 14 studies were eligible for inclusion in the review (four RCT's, three

single-arm clinical trials, and seven case reports or case series). Search strategy and result outlines in figure 1.

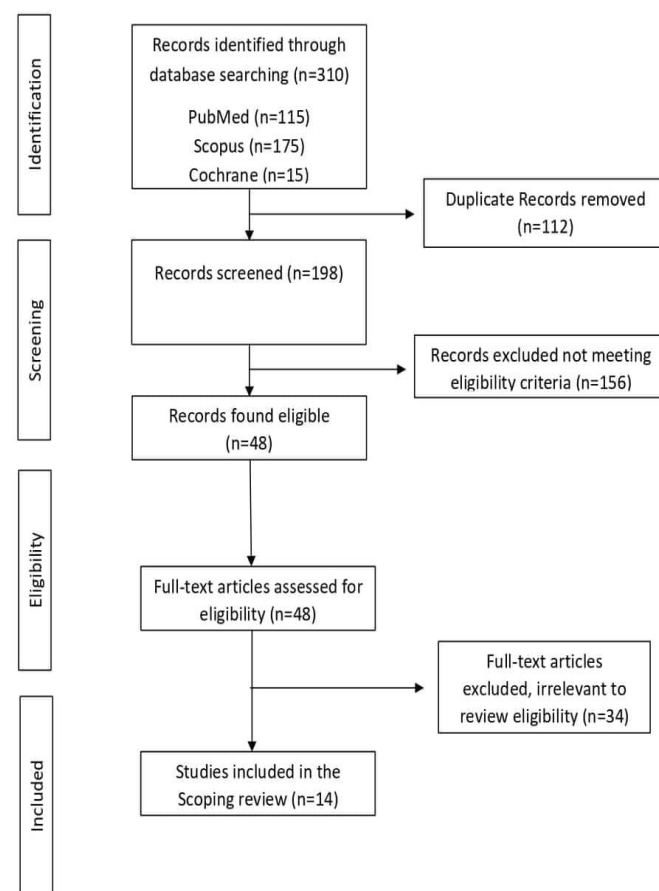


Figure 1: PRISMA-ScR Flow Diagram

Characteristics of Included Studies: The sample sizes of these studies varied from one patient to 46 hypothyroid participants. The period for which the intervention was given to patients varied from 10 days to 8 months. All 14 studies had adult study population diagnosed with hypothyroidism. The diagnostic assessment was majorly based on serum TSH levels supported with T3 & T4, Zulewski's clinical score, WHOQOL-BREF (quality of life) & Anthropometric parameters (Body weight, BMI, Waist circumference). Studies evaluated interventions such as Pharmacological (Single herbs. Polyherbal formulations, Herbo-mineral preparations), Panchakarma procedures (*Kshara Basti*) & Integrative approach (Ayurveda + Levothyroxine), Non pharmacological interventions (Diet, Yoga & Lifestyle management). Characteristics of individual studies is described in detail in the summary table 2.

Table 2. Summary of Included Studies

Sr. No.	Title	Journal	Authors	Study Design, Sample and Groups	Intervention Given	Key Findings	Secondary Outcomes	Key Conclusion	Data Analysis Software Used
1	Add on effect of Whole System Ayurveda protocol in suboptimal controlled Hypothyroidism - A randomized controlled trial [7]	Journal of Ayurveda and Integrative Medicine (2025)	Vivek, Chougale A, Joshi H, Tubaki BR	RCT; n=46 (23 per group); 37 drugs	WSAPH (Individualized protocol with counselling) + <i>vs Kanchanara Guggulu</i> (500 mg, 2 tablets thrice daily); 60 days	Significant improvement in TSH in WSAPH vs KG (p=0.02)	Weight, SFT, BFI, QoL, Zulewski Score improved (p<0.05)	WSAPH superior; individualized multimodal approach more effective	SPSS Version 25.0
2	Efficacy of <i>Vyoshadi Guggulu</i> and <i>Shadushana Churna</i> in the management of subclinical hypothyroidism: An open labelled randomized comparative pilot clinical trial [8]	AYU (2022)	Sharma VB et al.	Open-label RCT; n=21 (10 in Group A, 11 in Group B); 60 days	<i>Vyoshadi Guggulu</i> (6 g BD after lunch/dinner) <i>vs Shadushana Churna</i> (3 g BD after lunch/dinner)	TSH reduced: 16.61% in VG, 26.29% in SC (p<0.05)	BMI reduced significantly in both groups	Both effective; SC better for TSH, VG better for obesity	SigmaStat 4.0
3	Efficacy of <i>Pippali</i> in <i>vardhamana</i> and fixed dosage pattern in primary hypothyroidism - A randomized clinical trial [9]	Journal of Ayurveda and Integrative Medicine (2022)	Shah SB et al.	Uncontrolled trial; n=36 (18 per group); 19 days + follow-up	<i>Vardhamana Pippali</i> vs fixed-dose <i>Pippali</i> ; 3.6 g/day; total 69 g over 19 days	Significant TSH change	Zulewski score improved; Agni improved	Dosing pattern influences long-term outcomes	SPSS Version 20.0
4	Efficacy of Add-on Ayurveda Treatment Protocol in the Management of Subclinical Hypothyroidism: A Pilot Randomized Controlled Clinical Trial [10]	IJAM (2025)	Suketha Kumari et al.	Pilot RCT; n=30 (15 per group); 60 days	IATP (<i>Shiva Gutika</i> 2 g BD + diet + yoga) vs STTP (levothyroxine + standard diet)	TSH reduced 75% in IATP vs 4.6% in STTP (p<0.0001)	QoL, BMI improved only in IATP	Integrative approach highly effective	SPSS Version 25.0
5	A clinical study to evaluate the role of <i>Triphaladya Guggulu</i> along with <i>Punarnavadi Kashaya</i> in the management of hypothyroidism [11]	AYU (2018)	Singh K, Thakar AB	Single-arm; n=15; 45 days	<i>Triphaladya Guggulu</i> (500 mg, 2 tablets BD) + <i>Punarnavadi Kashaya</i> (30 mL BD)	No significant change in TSH	Significant symptom relief and weight reduction	Symptomatic improvement despite no biochemical change	Not specified
6	Effectiveness of <i>Vadavanala Vati</i> as	JAHM (2025)	Meghna KA, Girish	Single-arm; n=16; 45	<i>Vadavanala Vati</i> (500 mg, 2	TSH reduced significantly	T4 increased; symptoms	Effective adjunct	SPSS (version

	an adjunct in the Management of Hypothyroidism: An Open Label, Single Arm Clinical Study [12]		KJ	days	tablets TID)	(36.8%, p<0.05)	improved	therapy	not specified)
7	Effect of <i>Shigru</i> (<i>Moringa oleifera</i> Linn.) <i>Patra Choorna</i> Tablet in the Management of Subclinical Hypothyroidism – A Single Arm Open Labeled Clinical Trial [13]	JAHM (2025)	Shubham K, Arun C	Single-arm; n=30; 42 days	<i>Shigru Patra Churna</i> (1 g BD)	Significant TSH reduction (p<0.0001)	Weight, waist circumference reduced; edema resolved	Strong efficacy with large effect size	GraphPad Prism
8	Management of Hypothyroidism by <i>Kshara Basti</i> (Therapeutic Enema) – A Case Report [14]	AYU (2019)	Singh K et al.	Case report; n=1; 10 days + 2 months follow-up	<i>Kshara Basti</i> (5 days)	TSH reduced from 31.1 to 5.76 mIU/L	Symptom relief; RA factor increased	Rapid improvement with Panchakarma	Not applicable
9	Hashimoto's Thyroiditis and Hypothyroidism, Treated with <i>Shamana Chikitsa</i> Principles of <i>Panduroga</i> – A Case Report [15]	Journal of Ayurveda and Integrative Medicine (2025)	Anand PKV, Deshpande V	Case report; n=1; 8 months	<i>Panduroga Protocol</i>	TSH normalized; TPO reduced by 70%	Symptoms resolved; LT4 discontinued	Sustained remission achieved	Not applicable
10	Ayurvedic Approach in the Management of Hypothyroidism: A Case Study [16]	Journal of Neonatal Surgery (2025)	Sarode S et al.	Case study; n=1; 2 months	<i>Chandraprabha Vati</i> (250 mg BD) + <i>Kanchanar Guggulu</i> (250 mg)	TSH reduced by 68.7%	PCOS symptoms improved	Effective in comorbid conditions	Not applicable
11	Ayurvedic Management of Coexisting Hypothyroidism and PCOS: A Case Report [17]	JAHM (2025)	Doddamani SH et al.	Case report; n=1; 6 months	<i>Agnitundi Vati</i> (250 mg BD) + <i>Kanchanar Guggulu</i> (500 mg BD)	TSH reduced from 39.4 to 5.86	Weight loss; cycle normalized	Long-term sustained benefits	Not applicable
12	Role of Ayurveda in the Management of Hypothyroidism – A Case Report [18]	Indian Journal of Ayurveda and Integrative Medicine (2022)	Kapoor A, Raturi S	Case report; n=1; 5 months	<i>Kanchanar Guggulu</i> (250 mg BD) + <i>Chitrakadi Vati</i> (250 mg OD) + <i>Kumaryasava</i> (20 mL)	Gradual TSH reduction	Menstrual cycle normalized	Effective long-term management	Not applicable
13	Ayurvedic Management of Subclinical Hypothyroidism vis-à-vis <i>Kaphavrita Udanavata</i> – A Case	JAHM (2023)	Vedavati, Belavadi SN	Case report; n=1; 60 days	<i>Haritakyadi Yoga</i> (3 g BD before food for 7 days) followed by <i>Panchatikta</i>	TSH reduced by 29.8%	Symptom relief	Supports Ayurvedic conceptual framework	Not applicable

Report [19]					<i>Ghrita</i> <i>Guggulu</i> (500 mg, 2 tablets TID for 60 days)				
14	<i>Kanchnar guggulu and varunadi kashaya</i> in hypothyroidism – a case study [20]	International Journal of Ayurveda and Pharma Research (2014)	Jagmeet K, Milan C	Case study; n=1; 60 days	<i>Kanchanar Guggulu + Varuna di Kashaya</i>	Lab data not reported	Symptom relief; reduced swelling	Clinically beneficial	Not applicable

Methodological Characteristics of included Studies: In accordance with scoping review methodology, a formal critical appraisal of included studies was not performed in keeping with scoping review methodology. However, there was considerable methodological heterogeneity among studies in terms of study design, interventions, sample size, and outcome measures. Various studies had small number size and short follow-up duration, especially the case reports and single arm trials. Despite the above limitations, the included studies provide useful preliminary clinical information on the role of Ayurveda interventions in treatment of hypothyroidism.

Results of individual sources of evidence: Across 14 studies on biochemical and/or clinical outcomes, most interventions were associated with benefits on both types of parameters. Outcome reporting varied across the included studies. While most studies reported biochemical outcomes such as serum TSH, T3, and T4 levels, some studies primarily reported clinical symptom improvement, quality-of-life measures, or patient-reported outcomes. Therefore, findings are presented according to the outcomes reported in the original studies. Various research studies reported betterment in anthropometric specifications such as weight, BMI. In one randomized controlled trial in which Integrative medicine protocol shows regularly disclosed bigger enhancements on TSH with professional results about conventional treatment whereas in three RCT's only polyherbal medicines (RCT's) constantly improved TSH and functions to a small degree. Single-arm research studies were related to scientifically

purposeful decreases in TSH level and also benefited in symptomatic advantages. Case reports and case series demonstrated substantial improvements in TSH (including normalization in some cases), resolution of symptoms, improved associated parameters such as a polycystic ovarian syndrome in some cases. One case report documented supervised tapering or discontinuation of levothyroxine after Ayurveda treatment with sustained clinical improvement.

Synthesis of results: generally, there is initial data which show potential benefits with Ayurvedic therapies and treatment in hypothyroidism and SCH, including biochemical (e.g., reduced TSH), clinical (e.g., improved symptoms), metabolic (e.g., reduced body weight and BMI), and HRQoL benefits. Pharmacological interventions, mostly polyherbal interventions, were the most studied and showed consistent biochemical, clinical, and HRQoL benefits. Integrated intervention interventions combining Ayurveda and diet and lifestyle interventions, and at times combined with levothyroxine, appeared superior over monotherapy. Panchakarma interventions such as *Kshara Basti* appeared to be promising, albeit with evidence from limited studies. Supportive components within integrative Ayurveda Protocols including diet and lifestyle interventions also showed important supportive roles. Both pharmacological and non-pharmacological interventions except levothyroxine discontinuation had some implied pharmacology and mechanisms, much of which are based on limited preclinical and preliminary clinical studies. Levothyroxine discontinuation was particularly noteworthy,

with many studies showing high discontinuation rates and often reporting on indicators for levothyroxine withdrawal, suggests possible potential in restoration of endogenous thyroid function in selected patients. The current evidence base is still heterogeneous; future larger, well conducted randomized trials using regulated protocols and long follow-up are required to fill various gaps in knowledge. Despite the fact that inclusion of multiple study designs allowed comprehensive mapping of available evidence, different treatments protocols, sample size, study methodology, duration, follow-up and outcomes. Therefore, finding should be interpreted descriptively rather than as evidence of comparative effectiveness.

Results of included studies: The studies included showed methodological variety with respect to range of clinical evidence for evaluation of Ayurvedic interventions in hypothyroidism and subclinical hypothyroidism. Of the total 14 studies, four were RCT's, three were single-arm clinical studies, and seven was case report/case series. Thyroid stimulating hormone (TSH) was the main end result step in all studies with triiodothyronine (T3) thyroxine (T4) as well as result steps based on validated clinical scales such as Zulewski's rating coupled with WHOQOL-BREF functioning as sustaining end results. Randomized controlled studies showed relatively strong evidence comparatively with integrative and whole system Ayurveda approaches showing statistically significant reduction in TSH levels and improvement in quality of life and anthropometric parameters. The multimodal protocol had reported higher reduction in TSH (up to 75%) with respect to standard of care while whole system Ayurveda protocol was superior to single-drug interventions.

Single-arm studies observed substantial improvements in biochemical and clinical parameters, which were consistent across studies. Most studies reported significant reduction TSH levels, weight, and severity of symptoms. One of the studies noted slight reduction in free T3 and a non-significant increase in TSH. However, this study also observed marked reduction in mean quantitative scores of

signs and symptoms, with 75% patients reporting marked improvement. This suggests a likely uncoupling of biochemical and clinical outcomes in short duration interventions. The case reports and case series reflect the detailed aspects of individualized approach of Ayurvedic management. There was a marked reduction in TSH levels and restoration of thyroid function to normal levels. Further, these studies extensively reported resolution of signs and symptoms as well as improvement in associated conditions such as polycystic ovarian syndrome. Supported by reduction in levothyroxine dosage and restoration of thyroid function after discontinuation of levothyroxine in several cases and sustained follow-up outcomes, these reports suggest restoration of endogenous thyroid function. Interventions with single herbs, polyherbal formulations, Herbo mineral formulations, Panchakarma procedures, and combined approach administered across studies were associated with favorable outcomes, with minimal adverse effects, suggesting Ayurveda can play a potential role in the management of hypothyroidism.

Charting results: A summary of data charted across the included studies especially around patterns of intervention types, outcomes and clinical significance. Interventions were primarily pharmacological in nature, encompassing single herbs like *Shigru* (*Moringa oleifera*), and *Pippali* (*Piper longum*), polyherbal formulations like *Kanchanara Guggulu*, *Vyoshadi Guggulu*, herbo-mineral preparations e.g., *Chandraprabha Vati* and *Shiva Gutika*. Interventions were oriented towards improvement in thyroid function, correction of metabolism and symptoms of hypothyroidism. Non-pharmacological interventions like dietary modifications, yoga and lifestyle interventions were commonly added as part of the treatment and these interventions had additional benefits in improving quality of life and anthropometric parameters. Panchakarma interventions, particularly *Kshara Basti* was employed in one case report primarily documented improvement in clinical symptoms and overall wellbeing; however, detailed thyroid laboratory parameters were not reported.

Therefore, the findings were considered as evidence of clinical improvement rather than biochemical outcomes. Outcome measures were largely homogeneous across studies with TSH being the primary outcome measure of efficacy, followed by T3 and T4 as surrogate markers in biochemical domain. Clinical assessment tools and anthropometric measures were also employed across studies and added strength to outcome evaluation. Only limited number of studies reported effect size, it makes difficult to compare different interventions. Among different studies, *Shigru Patra Churna* and integrative Ayurvedic treatment protocols demonstrated moderate to large improvements in selected outcomes. Adverse events were infrequently reported, with a few minor self-limiting events documented. However, the available evidence is insufficient to draw definitive conclusion regarding long

term safety of Ayurvedic intervention because, most of the studies had small sample sizes and short follow-up durations. Thyroid dysfunction, metabolic correction, quality-of-life, symptom improvement, anthropometry. Ayurvedic interventions have multidimensional utility in thyroid disorder as these interventions show benefits across multiple domains of health in patients of hypothyroidism. Ayurvedic approach utilize a combination of intervention strategies—single, compound, polyherbal or herbo-mineral— within an individualized approach towards improved biochemical function, increased sense of health and improved quality of life. Studies report moderate-to-large effect size for Ayurvedic interventions and modest safety profile in the treatment of SH and mild HT. (Table 3 and 4)

Table 3. Intervention-Based Classification of Studies:

Intervention Type	Total number of studies	Representative study
Whole-system/Integrative Ayurveda Protocols	2	WSAPH, IATP
Single herbs	2	<i>Shigru Patra Churma</i> (Shubham & Arun), [13] <i>Pippali</i> (Shah et al.), [9]
Polyherbal formulation	6	<i>Vyoshadi guggulu</i> (Sharma et al.) [8] <i>Shadushana churna</i> (Sharma et al.) [8] <i>Vadavanala vati</i> (Meghana & Girish) [12] <i>Triphaladya Guggulu</i> (Singh & Thakar) [11] <i>Panchtiktha Ghrita Guggulu</i> (Vedavati & Belavadi) [19] <i>Kanchanar Guggulu</i> (Jagmeet & Milan) [20]
Herbo - mineral Compounds	3	<i>Chandraprabha vati</i> (sarode et al.) [16] <i>Agnitundi vati</i> (Doddamani et al.) [17] <i>Shiva Gutika</i> (Suketha kumari et al.) [10]
Panchakarma and External Therapies		
<i>Kshara Basti</i>	1	<i>Kshara basti</i> (singh et al.) [14]
Supportive Components within Integrative Ayurveda Protocols		
A. Diet + Yoga	1	IATP diet + yoga (Suketha kumari et al.) [10]
B. Lifestyle Modification	1	<i>Pathya – Apathya</i> (multiple studies)

Table 4: Common Ayurveda Herbs, Polyherbal Combinations and Herbo-mineral

Category	Commonly Used Drugs
Single herbs	<i>Shigru</i> (<i>Moringa oleifera</i>), <i>pippali</i> (<i>piper longum</i>), <i>Shunthi</i> (<i>zingiber Officinale</i>), <i>Maricha</i> (<i>piper Nigrum</i>), <i>Haritaki</i> (<i>Terminalia chebula</i>)

Polyherbal combinations	<i>Kanchanara Guggulu, Vyoshadi guggulu, Shadushana churna, Vadavanala vati, Triphaladya Guggulu, Panchatiktha Ghrita guggulu</i>
Herbo-mineral	<i>Chandraprabha vati, Agnitundi vati, Shiva gutika</i>
Kashaya/kwatha	<i>Varunadi Kashaya, Punnarnavadi Kashaya, Nagaradi Kashaya</i>
Asava/Arishta	<i>Kumaryasava</i>

Summary of Findings: The scoping review revealed that Ayurvedic interventions have encouraging effects on hypothyroidism and subclinical hypothyroidism across different study designs. Majority of studies demonstrated a significant decrease in TSH levels, clinical symptoms. Improvements in anthropometric parameters such as body weight and BMI were reported in limited number of studies. These findings suggest complex/whole systems approaches are more effective than single drug interventions. Polyherbal formulations especially *Kanchanara Guggulu*-based interventions were predominantly used interventions while some single herbs like *Shigru* showed large effect sizes. *Panchakarma* procedures and lifestyle interventions seem to have added benefits. A significant proportion of patients on Ayurvedic treatment were able to stop levothyroxine therapy suggesting the possibility of endogenous thyroid functioning in some cases. Safety outcome was satisfactorily good across studies with minimal adverse effects. Despite the positive findings, the available evidence is limited due to small sample sizes and variability in study designs, and limited follow-up in controlled studies. The existing body of evidence Favors the role of Ayurveda as a safe and potentially effective complementary or alternative modality for thyroid health but requires further high-quality research.

Key Management Principle Identified:

Narrative reviews of included clinical studies suggested that Ayurvedic treatment for hypothyroidism is based mostly on following four principles *Shodhana* (purification), *Shamama* (Palliation), *Rasayana* (rejuvenation) and *Ahara-Vihara* (diet and lifestyle).

Shodhana procedures: *Kshara Basti* was the most common

Panchakarma procedure administered especially in subjects who had chronicity of hypothyroidism or associated autoimmune conditions. *Kostha Shuddhi* precedes administration of *Basti* to improve *Ama pachana* and *Agni Deepana*.

Shamana Therapy: This was the most common approach and involved classical herb, polyherbal formulation and Herbo-mineral preparations aimed at strengthening Agni, reducing Kapha and Meda and favourably modulate thyroid function.

Dietary Recommendations: included emphasis on *katu* and *tikta* tastes, *Ushna* and *Teekshna* properties, millet-based foods, avoidance of *Guru* and oily foods.

Lifestyle regimens: such as yoga, Pranayama, meditation and follow the guidelines of daily regimens (*Dinacharya*), which has an important role in metabolic and psychosocial problems.

4. DISCUSSION

This scoping review aimed to map the extent, range, and nature of available clinical evidence regarding Ayurvedic interventions for hypothyroidism and subclinical hypothyroidism. Fourteen studies were identified, including randomized controlled trials, single-arm clinical studies, and case reports/case series. The available evidence demonstrated substantial heterogeneity in study design, intervention characteristics, treatment duration, and outcome measures, while suggesting potential improvements in biochemical and clinical outcomes following Ayurvedic interventions. This article outlined the available clinical data and protocols and treatments on Ayurvedic interventions for hypothyroidism and subclinical hypothyroidism. Total 14 studies were included

- RCTs, single-arm studies, and case reports, which representing a diversifying because of different designs studies were included. The findings from this article tells that Ayurvedic interventions— especially whole-system interventions, polyherbal formulations such as *Kanchanara Guggulu*, Panchakarma procedures like *Kshara Basti*, and integrative approaches with diet and yoga—are found most and consistently effect in improvements of thyroid function, clinical symptoms, and QOL. Studies which have strong evidences and data, i.e., RCT's, consistently found significantly decreased TSH and improved anthropometric and quality-of-life of the patients. Single-arm studies and case reports also showed significant improvements in normalization of thyroid parameters and features. Specifically, some studies also reported supervised reduction or discontinuation of levothyroxine though these observations require confirmation in controlled studies. Several important research gaps were identified through this review. Most included studies involved small sample sizes, short treatment durations, heterogeneous intervention protocols, and limited follow-up periods. Standardized outcome measures and comprehensive safety reporting were also inconsistently reported. These findings highlight the need for larger and methodologically rigorous studies in this field.

Results and statistical tools: Serum TSH was the primary outcome measure reported in included studies if accompanied by T3, and T4 as well as validated clinical tools e.g. Zulewskis score or WHOQOL-BREF. Statistical analysis was predominantly restricted to within-group or between-group comparisons based on p-values with the majority of authors setting statistical significance at $p < 0.05$. Of the trials that reported effect sizes, moderate to large effects were observed in a number of interventions, particularly *Shigru Churna* and integrative treatment protocols. All included RCTs reported statistically significant reductions in TSH levels between groups. All single-arm studies reported a clear trend toward improvement in primary outcomes, but consistency was variable. Variability in statistical methods

conducted, lack of uniformity in reporting, and lack of sophisticated statistical tools, e.g., confidence intervals or regression analysis, limit the weight and generalizability of findings.

Interpretation: These clinical outcomes may be accounted for from an integrated Ayurvedic and biomedical point of view. The concept of *kaphavarana ja udana vata* (dysfunction of *udana vata* [neuro-endocrine coordination] due to obstruction by *Kapha* [anabolic principle]) explains the hypo-functioning at a metabolic level which biomedical system identifies as hypo-functioning of thyroid gland. Likewise, *Dhatvagnimandya* explains the dysfunction at the level of tissue metabolism. The *Deepana* (Appetizer) and *Pachana* (Digestant) type of therapies are aimed towards improving *dhatwagni* by correcting the *Ama*. This mechanism of action is corroborated by improvement in thyroid function and reduction of auto-immune markers (anti-TPO) in Hashimoto's Thyroiditis/Autoimmune Thyroiditis as seen in some of the earlier experimental studies on human subjects receiving *Chitrakadi Vati*. Other therapeutic actions of Ayurveda interventions such as constitutional detoxification (Panchakarma), dietary regulation, yoga and lifestyle modifications (through their impact in different systems including gut-thyroid axis and stress-mediated hypothalamic-pituitary thyroid axis) suggest that thyroid dysfunction in Ayurveda is targeted through multi-system regulation rather than prescription of isolated composition of hormonal dysregulation.

Evidence gap: Despite promising findings, important evidence gaps remain. The bulk of the studies identified comprised small sample sizes and short durations of follow up, precluding generalizability, and long-term inference. There was an absence of large-scale, multicentric randomized controlled studies with heterogeneity of interventions and outcome measures identified between studies (Table 1). Standardization of treatment protocols was missing between studies, and key markers such as thyroid autoantibodies, and reverse T3 were inconsistently reported. Additionally, case report reported high

levothyroxine stopping rates and are not reported in RCT's, with non-standardized levothyroxine withdrawal protocols. The most of studies from India limits the generalizability of findings.

Limitations: Only one-language studies were included, introducing the possibility of language bias. No formal risk of bias assessment was performed. Additionally, the studies included were characterized by small sample sizes, short durations of the studies and heterogeneity in both study design and intervention used. Mostly large proportion of the evidence and data was obtained from single-arm studies and case reports, which inherently are at higher risk of bias. Publication bias cannot be excluded; this review did not critically appraise the included studies which limits the strength of the conclusions made in this scoping review. Formal methodological quality is absent which may limit the strength of evidences. Another limitation of this review is it included diverse study designs ranging from randomized controlled trials to case reports. Several included studies incompletely reported participant demographics, diagnostic criteria, follow-up duration, and adverse-event data. Consequently, comprehensive characterization of these variables across all studies was not possible.

Future direction: In Future researches must focus on large sample size with conducting large, multicentric, double-blind RCTs design and follow-up duration. Standardized treatments protocols and patient outcomes measures should be specified, and incorporate objective biomarkers and quality-of-life measures, to facilitate between-trial comparisons. Well-designed studies on the safety and efficacy of tapered, structured levothyroxine interruption protocols or levothyroxine interruption under controlled conditions or both, will be needed. Finally, mechanistic studies involving gut thyroid axis, immune modulation and metabolic pathways may inform us on the complex etiopathogenetic mechanisms or pathways or both involved in Ayurvedic intervention.

5. CONCLUSIONS

Clinical studies evaluating efficacy of Ayurveda for hypothyroidism and subclinical hypothyroidism were searched from Pubmed, Scopus and Cochrane Central. The number of trials is small and the overall body of evidence is emerging but gradually strengthening. Limited number of studies consistently demonstrated beneficial and encouraging effects on thyroid function, clinical symptomatology and quality of life. However, the available evidence remains heterogeneous and is largely derived from small clinical studies and case reports., this review gathers current evidence to provide practical, evidence informed advice for integrative clinicians and the general public regarding Ayurveda interventions in hypothyroidism. Furthermore, these interventions offer additional advantages such as a good safety profile and holistic applicability. While doing so, this review also highlighted several important gaps in the existing evidence, including lack of generalizability, heterogeneous study designs, small sample size, mostly single centered and short-term interventions. Well-designed large-sampled multicentric RCTs with longer follow up durations are able to remove the current gaps and limitations.

Practical & Clinical Application: Ayurveda treatments can be considered as a safe, effective, cost-effective, potentially beneficial adjunctive approach for hypothyroidism management, despite contemporary therapy. Person to person varied protocols (Individualized protocol) including herbal formulations, Panchakarma therapies such as *Vamana*, *Basti*, and follow *Dincharya* regimens (diet, yoga, stress management) may help to improve thyroid biomarkers, reduce clinical features and symptoms, and improved quality of life.

Abbreviations:

TSH – Thyroid Stimulating Hormone; T3 – Triiodothyronine; T4 – Thyroxine
WHOQOL-BREF – World Health Organization Quality of Life - BREF
PCOS – polycystic ovarian syndrome; LT4 – Levothyroxine; QoL – Quality of life

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