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Coexistence of Rheumatoid Arthritis and Autoimmune Thyroid Disease: An Updated Review

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Abstract:
Autoimmune thyroid diseases (AITDs) primarily including Hashimoto's thyroiditis and Graves' disease, represent some of the most prevalent organ-specific autoimmune disorders worldwide. These conditions arise due to immune mediated destruction or stimulation of thyroid tissue leading to hypothyroidism or hyperthyroidism respectively. In recent years growing evidence has demonstrated that individuals diagnosed with Autoimmune thyroid diseases are at an increased risk of developing additional autoimmune diseases a phenomenon known as polyautoimmunity. Commonly associated conditions include type 1 diabetes mellitus, rheumatoid arthritis, systemic lupus erythematosus, pernicious anemia, celiac disease and vitiligo.
The coexistence of multiple autoimmune disorders is thought to result from shared genetic susceptibility, environmental triggers, hormonal influences and immune dysregulation mechanisms, including loss of immune tolerance and cross-reactive autoantibodies. The presence of thyroid autoantibodies, particularly anti-thyroid peroxidase (anti-TPO) antibodies may serve as markers of generalized autoimmune predisposition.
This review provides a comprehensive and structured overview of the epidemiology, immunopathogenesis, clinical spectrum and diagnostic considerations of coexisting Rheumatoid arthritus in patients with Or vice versa. It further highlights the clinical implications of polyautoimmunity, including increased disease burden, impact on quality of life and challenges in management. Emphasis is placed on the importance of early screening, risk assessment and multidisciplinary care approaches to improve patient outcomes. Understanding the interconnected nature

of autoimmune disorders is essential for timely diagnosis, individualized treatment strategies and long-term monitoring in patients with autoimmune thyroid And rheumatoid arthritis.

Keywords: Autoimmune thyroid disease, Hashimoto's thyroiditis, Graves' disease, polyautoimmunity, Rheumatoid arthritis.

Introduction

Autoimmune thyroid diseases (AITDs) are the most prevalent organ-specific autoimmune disorders affecting nearly 5% of the global population and showing a striking female predominance with female-to-male ratios ranging from 5:1 to 10:1[1,2]. These conditions arise from a multifactorial interplay of genetic predisposition, environmental triggers, immune dysregulation and emerging factors such as gut microbiota and micronutrient imbalances which collectively contribute to the breakdown of self tolerance against thyroid antigens[3,4].

The two principal clinical entities within Autoimmune thyroid diseases are Hashimoto's thyroiditis (HT) and Graves' disease (GD) which represent opposite ends of the thyroid functional spectrum. HT the leading cause of hypothyroidism in iodine-sufficient regions is characterized by progressive lymphocytic infiltration, follicular cell destruction and circulating autoantibodies such as anti thyroid peroxidase (Anti TPO). Recent studies highlight the role of novel biomarkers including cytokine signatures, microRNAs and metabolomic profiles in predicting disease progression and therapeutic response[5,6]. In contrast Graves' disease is distinguished by thyroid stimulating immunoglobulins (TSI) targeting the TSH receptor leading to uncontrolled thyroid hormone synthesis and secretion. Advances in understanding TSH receptor signaling and immune checkpoint pathways are opening avenues for more targeted therapies[7,8].

Beyond thyroid dysfunction Autoimmune thyroid diseases are increasingly recognized as part of a polyautoimmune spectrum with strong associations with type 1 diabetes mellitus, rheumatoid arthritis, systemic lupus erythematosus, celiac disease, pernicious anemia, vitiligo and Addison's disease. Recent Studies demonstrated the asssociation of rheumatoid artgritris and Autoimmune thyroid diseases specifically due to shared mechanisms the shared immunogenetic background and gut microbiota alterations as key drivers of this clustering underscoring the systemic nature of immune dysregulation [9,10].

From a public health perspective Autoimmune thyroid diseases and rheumtaoid arthritis significantly to morbidity via long term complications such as cardiovascular disease, osteoporosis and impaired quality of life. Since one autoimmune condition may trigger another due to shared immunopathological mechanisms early screening for thyroid autoantibodies in patients with RA and RA specific antibodies in patients with autoimmune thyroid dysfunction is recommended. Timely identification and management of these coexisting conditions may improve patient outcomes and quality of life. Therefore the present review aims to explore on the coexistance and potential association between thyroid autoimmunity and rheumatoid arthritis [11–13].

Methods

A comprehensive literature search was conducted using PubMed, Scopus and Web of Science databases for studies published between 2015 and 2025. Keywords used included "autoimmune thyroid disease,"

"polyautoimmunity" "Hashimoto's thyroiditis" "Graves disease inflammation" and "Rheumatoid arthritis."

Inclusion criteria:

- Observational studies (cross-sectional, cohort, case-control)
- Meta-analyses and systematic reviews
- Studies reporting prevalence or association data

Exclusion criteria:

- Case reports with small sample sizes
- And other autoimmune conditions
- Non-English publications

Sr. No.	Study (Author, Year)	Research Focus	Key Observations	Conclusion
1	**Priya et al., 2025**[14]	Anti-TPO and hsCRP in SCH	Anti-TPO identifies autoimmune SCH: hsCRP reflects systemic inflammation	Combined anti-TPO and hsCRP improves risk stratification in SCH
2	**Shah et al., 2025**[15]	Prevalence of AITD in hypothyroidism	Anti-TPO positivity ~79% in hypothyroid patients: strong female predominance	Autoimmunity leading cause of hypothyroidism: routine anti-TPO testing recommended
3	**Datta et al., 2025**[16]	Thyroid dysfunction and autoimmunity in RA (E. India)	37% thyroid dysfunction in RA vs 18% controls: anti-TPO 57.5% in RA	RA patients have increased thyroid dysfunction and autoimmunity: routine screening
4	**Gaber Soliman et al., 2025**[17]	Anti-TPO effect on RA activity	Anti-TPO positivity linked to higher ESR, CRP, RF, anti-CCP, DAS-28: more severe synovitis	Anti-TPO indicates amplified autoimmune burden in RA: routine screening recommended
5	**Kumar MS et al., 2025**[18]	Thyroid dysfunction in RA	38.2% prevalence; SCH most common: anti-TPO 65.1%	Thyroid abnormalities exacerbate RA severity: screening clinically important
6	**Vedant Maheshwari et al., 2025**[19]	Thyroid dysfunction in RA	35.4% prevalence; SCH 20%, overt 12.3%: anti-TPO 29.2%	Thyroid dysfunction common in RA and linked to inflammation: screening recommended
7	**Tripolino et al., 2024**[20]	Circulating autoantibodies in Hashimoto's thyroiditis (HT)	HT patients had higher TSH (2.215 vs 1.705 µIU/mL); increased APCA (16.3% vs 4.1%) and atypical ANCA	HT is associated with broader autoimmune burden; APCA and ANCA positivity may predict

			(27.3% vs 10.2%): elevated IL-1α in ANCA-positive females	systemic involvement and gastritis risk.
8	**Sharma et al., 2024**[21]	Dyslipidemia and inflammatory markers in subclinical hypothyroidism (SCH)	SCH patients had higher TSH (8.95 vs 2.29 µIU/ml), elevated LDL and triglycerides, raised CRP (4.64 vs 2.34 mg/L), ESR slightly higher but not significant	SCH is associated with dyslipidemia and elevated inflammatory markers, indicating increased cardiovascular risk.
9	**Diab & Obaid, 2024**[22]	Hashimoto's prevalence in RA	32.14% prevalence of HT in RA: associations with anti-CCP, BMI, ESR	HT common in RA and linked to inflammatory markers: integrated screening advised
10	**Li et al., 2024**[23]	Thyroid dysfunction in RA vs controls	30% prevalence in RA vs 7% controls: RA had lower T3/FT3, higher TSH and TPOAb	RA patients more susceptible to thyroid dysfunction: monitor HGB and TC
11	**Karakılıç et al., 2024**[24]	Hypothyroidism, autoantibodies, and RA activity	High hypothyroidism prevalence in RA: anti-TPO positivity correlated with higher DAS28	Thyroid autoimmunity may increase RA activity: screening valuable
12	**Gupta et al., 2024**[25]	SCH and inflammatory markers	SCH: higher TSH, lower T3, dyslipidemia, elevated ESR/CRP/IL-6: positive TSH-inflammation correlation	SCH linked to dyslipidemia and systemic inflammation: early detection advised
13	**Lichtiger et al., 2024**[26]	AITD and RA coexistence review	Shared genetic loci: AITD linked to higher RA activity and comorbidities	Thyroid autoimmunity marks systemic inflammation in RA: screening advised
14	**Tripolino et al., 2024**[27]	Autoantibody burden in euthyroid HT	Higher prevalence of APCA, ANA, atypical ANCA in anti-TPO–positive HT	HT reflects systemic immune activation: comprehensive autoimmune screening needed
15	**Anil Kumar R et al., 2024**[28]	Anti-TPO in SCH and hypothyroidism	Anti-TPO positivity 42% in SCH and 69.2% in clinical hypothyroidism: associated with obesity and dyslipidemia	Anti-TPO predicts progression to overt hypothyroidism: routine testing essential
16	**Meher et al., 2023**[29]	Thyroid dysfunction and inflammatory markers in RA	19% thyroid dysfunction (mostly SCH): elevated ESR, CRP, anti-CCP in dysfunction groups	Thyroid dysfunction in RA associated with higher inflammatory markers
17	**Kumar &**	Thyroid	14% prevalence in RA vs 5%	Thyroid dysfunction more

	Kumari, 2023[30]	dysfunction in RA (Eastern India)	controls: mostly hypothyroidism	common in RA: screening essential
18	**Mathew et al., 2023**[31]	Thyroid dysfunction in newly diagnosed RA	28.21% prevalence: SCH most common: significant association with RA activity	Routine thyroid screening recommended in RA care
19	**Duan et al., 2023**[32]	Mendelian randomization RA ↔ hypothyroidism	RA increased hypothyroidism risk (OR 1.28): hypothyroidism increased RA risk (OR 1.68)	Bidirectional causal relationship: routine hypothyroidism screening in RA warranted
20	**Vudu et al., 2023**[33]	Autoimmune hypothyroidism and hs-CRP	Elevated hs-CRP in overt and SCH: levothyroxine reduced hs-CRP	Hypothyroidism is pro-inflammatory: hs-CRP useful for monitoring
21	**Panda et al., 2022**[34]	hs-CRP levels in SCH	SCH patients had significantly higher TSH (8.56 vs 2.28 µIU/ml), hs-CRP (2.93 vs 1.16 mg/L), elevated cholesterol and triglycerides, lower HDL	Elevated hs-CRP in SCH highlights systemic inflammation and cardiovascular risk: hs-CRP correlates positively with TSH.
22	**Khaleel & Hussain, 2022**[35]	Thyroid dysfunction and autoantibodies in rheumatoid arthritis (RA)	6% of RA patients had thyroid dysfunction: 9% positive for anti-TPO, 13% positive for anti-TG: CRP and anti-CCP significantly higher in RA vs controls	RA patients show coexistence of thyroid dysfunction and autoantibodies: thyroid abnormalities may exacerbate RA severity.
23	**Liu et al., 2022**[36]	Meta-analysis of RA and thyroid dysfunction	29 studies: OR 2.25 for hypothyroidism: heterogeneity by study type	RA patients have elevated risk of hypothyroidism: routine screening recommended
24	**Huang et al., 2022**[37]	Hypothyroidism risk in RA patients (Taiwan NHIRD cohort)	16,714 RA patients vs 66,856 controls: hypothyroidism incidence 1.74 fold higher in RA (16.6 vs 9.52 per 10,000 person years). Adjusted HR 1.67. Risk higher in women (3.6× men), elderly and with comorbidities (stroke HR 3.85).	RA patients have significantly increased risk of hypothyroidism, especially women and elderly; comorbidities amplify risk. Close monitoring is needed.
25	**Nazary et al., 2021**[38]	Thyroid dysfunction in newly diagnosed RA	25.25% prevalence in RA vs 11.5% controls: higher primary and SCH rates	Thyroid dysfunction more common in RA: routine screening recommended

26	**Ashwini Manish Jantikar et al., 2020**[39]	Anti-TPO antibodies and thyroid dysfunction	44% anti-TPO positivity; higher than Australia (21%) and Greece (24.1%): mean age 33.7; more in females	Anti-TPO strongly correlates with thyroid dysfunction, esp. hypothyroidism in reproductive-age females
27	**Singh et al., 2020**[40]	Anti-TPO and AITD in India	36.5% TPOAb positivity: higher in women; SCH most common	TPOAb positivity common, esp. in women: testing valuable for AITD management
28	**Anand & Gupta, 2019**[41]	Thyroid dysfunction in young adults	Hypothyroidism group had significantly higher TSH (11.69 vs 1.88 µIU/ml) and lower FT3/FT4 compared to controls: TSH higher in females	Hypothyroidism in young adults shows raised TSH and reduced FT3/FT4, more pronounced in females.
29	**Farebrother et al., 2019**[42]	Iodine intake and thyroid function	U-shaped relationship: excess iodine linked to increased thyroid autoimmunity (TPOAb, TgAb)	Maintain optimal iodine: excess may trigger autoimmune thyroid disease
30	**Waseem et al., 2019**[43]	Thyroid dysfunction prevalence and RA activity	42.2% prevalence in RA: SCH most common; thyroid dysfunction linked to higher DAS28-ESR, VAS, ESR	Thyroid dysfunction exacerbates RA activity: routine screening needed
31	**Li et al., 2019**[44]	Case-control and meta-analysis of RA & thyroid dysfunction	Case-control: 32.3% in RA vs 14.2% controls (OR 2.89): meta: pooled RR 2.86	RA patients have increased risk of thyroid dysfunction: screening advised
32	**Dutta et al., 2019**[45]	Anti-TPO in clinical and subclinical hypothyroidism	63.5% positivity overall: higher in clinical (70.3%) vs subclinical (51.5%): TSH correlated with anti-TPO	Anti-TPO testing valuable: autoimmunity major cause of hypothyroidism
33	**Azeem et al., 2019**[46]	Hypothyroidism prevalence and RA severity	28% thyroid dysfunction in RA: hypothyroidism linked to higher DAS-28, ESR, CRP	Hypothyroidism common in RA and increases disease severity: screening needed
34	**Siriwardhane et al., 2019**[47]	Predictive value of anti-TPO	Anti-TPO positivity preceded thyroid dysfunction by ~250 days (hypo) and ~277 days (hyper)	Anti-TPO is a sensitive early marker for thyroid disease progression
35	**Saqre et al., 2018**[48]	AITD in RA patients	RA patients had higher ATG and ATPO and more thyroid dysfunction: AITD linked to higher ESR and DAS28	AITD frequent in RA; routine thyroid screening recommended
36	**Debbarma et**	Thyroid	21.35% prevalence in RA vs	Thyroid dysfunction more

	al., 2017[49]	dysfunction in rheumatoid arthritis (RA)	4.85% controls: subclinical hypothyroidism common: higher dysfunction in low RA activity	common in RA: routine screening recommended
37	**Srivastava & Singh, 2017**[50]	TPOAb positivity and dyslipidemia in SCH	56% TPOAb positivity: significant association with elevated TC, LDL, TG	TPOAb-positive SCH patients more prone to dyslipidemia and CVD
38	**Posselt et al., 2017**[51]	Thyroid autoantibodies in SARDs	Higher prevalence in SLE and SSc vs controls; no significant difference in RA/SpA; no correlation with disease activity	SLE and SSc linked to thyroid autoantibodies: presence not correlated with activity
39	**Tekaya et al., 2016**[52]	Thyroid abnormalities in RA patients	40% prevalence of thyroid abnormalities in RA: mostly asymptomatic nodules: no difference in RA activity between patients with and without thyroid disease	Thyroid abnormalities are common in RA: screening is recommended, though they do not alter RA characteristics.
40	**Atalay et al., 2016**[53]	HT in rheumatic diseases	Higher HT prevalence in ARD/AIRD vs controls, esp. females: increased autoantibodies	Routine thyroid testing in ARD/AIRD patients, particularly females
41	**Sunitha K.G. & Padmini Ekambaram, 2016**[54]	Anti-CCP in autoimmune SCH	Anti-CCP positivity 20% in autoimmune SCH vs 2.5% non-autoimmune: female predominance	Autoimmune SCH may predispose to RA: consider anti-CCP screening
42	**Lathia, 2015**[55]	Rising prevalence of thyroid disorders	SCH prevalence 9.4% in Indian adults: linked to aging, iodine exposure, obesity, and autoimmunity: 53% of SCH patients positive for anti-TPO	Increase in thyroid disorders likely due to aging, iodine sufficiency, obesity, and autoimmunity: careful screening and management needed.
43	**Gupta et al., 2015**[56]	SCH, inflammation, and CVD risk	SCH linked to elevated CRP, IL-6, TNF-α, homocysteine: LT4 improves markers	SCH associated with chronic inflammation and CVD risk: early treatment beneficial
44	**Srinivasa Rao et al., 2014**[57]	Treatment considerations in SCH	Progression to overt hypothyroidism linked to high TSH and anti-TPO positivity: cardiovascular risk higher if TSH >10 mIU/L: lipid abnormalities improve with	Treat SCH when TSH >10 mIU/L or with symptoms/antibody positivity: therapy reduces lipid abnormalities and cardiovascular risk.

			thyroxine therapy	
45	**Siddhartha Kumar et al., 2014**[58]	RA, thyroid dysfunction, and MetS	Higher AITD and SCH in RA; MetS more common in RA	Screen RA patients for thyroid dysfunction and CVD risk
46	**Shrivastava et al., 2014**[59]	Inflammatory markers in RA and correlation with disease activity	110 RA patients vs 55 controls: hs-CRP, IL-6, TNF-α significantly elevated; IL-10 also higher but negatively correlated with DAS28. hs-CRP, IL-6, TNF-α positively correlated with disease activity.	Inflammatory markers reflect RA activity and pathogenesis; hs-CRP, IL-6, TNF-α are potential biomarkers for monitoring disease severity.
47	**Elattar et al., 2013**[60]	Hypothyroidism and thyroid autoantibodies in RA	Hypothyroidism in 24% RA patients; TSH correlated positively with RA activity markers	Hypothyroidism common in RA and associated with disease activity
48	**Raza & Mahmood, 2013**[61]	Subclinical hypothyroidism (SCH): controversies and consensus	SCH prevalence 3–8% (higher in women, elderly). Progression to overt hypothyroidism 2.6–4.3% per year: risk higher with thyroid antibodies, goiter, autoimmune diseases. SCH linked to CVD, pregnancy complications, neuropsychiatric issues, metabolic syndrome, dyslipidemia.	Treatment recommended if TSH >10 mU/L: controversial for 4.5–10 mU/L unless symptomatic, antibody positive or pregnant. SCH contributes to systemic inflammation and cardiovascular risk.
49	**Baruah & Bhattacharya, 2012**[62]	Serum CRP in sub-acute thyroiditis (SAT) vs Graves' disease	CRP elevated in 61% of SAT patients; mean CRP 27.55 mg/L vs 4.09 mg/L in Graves': CRP sensitivity 73.3%, specificity 53.8% (better than ESR)	Serum CRP is significantly higher in SAT and can differentiate inflammatory from non-inflammatory thyrotoxicosis.
50	**Roldan et al., 2012**[63]	AITD in Colombian RA patients	9.8% AITD: 37.8% TPOAb: 20.8% TgAb: associations with diabetes, thrombosis, BMI	AITD common comorbidity in RA: active screening recommended
51	**Cárdenas Roldán et al., 2012**[64]	Prevalence and impact of autoimmune thyroid disease (AITD) in RA	In 800 Colombian RA patients: AITD prevalence 9.8%; TPOAb 37.8%, TgAb 20.8%. AITD associated with diabetes, thrombosis, abnormal BMI, higher education. Literature review showed global	AITD is not uncommon in RA and increases risk of diabetes and cardiovascular disease; systematic assessment is warranted.

			prevalence variation (0.5–27%).	
52	**Ghoraishian et al., 2006**[65]	Anti-TPO and thyroid parameters	Elevated anti-TPO correlated positively with TSH and negatively with T4	Anti-TPO clinically significant for diagnosing/monitoring autoimmune thyroid disorders

Epidemiology

Autoimmune thyroid diseases (AITDs) are the most prevalent organ-specific autoimmune disorders globally affecting nearly 5% of the population[1]. They exhibit a marked female predominance with female-to-male ratios ranging from 5:1 to 10:1 reflecting the influence of sex hormones and genetic susceptibility on immune regulation[2,10]. The two major clinical entities within Autoimmune thyroid diseases are Hashimoto's thyroiditis (HT) and Graves' disease (GD). HT is the leading cause of hypothyroidism in iodine-sufficient regions and is characterized by progressive lymphocytic infiltration and destruction of thyroid tissue accompanied by circulating anti-thyroid peroxidase (anti-TPO) and anti-thyroglobulin (anti-Tg) antibodies[3–5,20,28,39,40,45,47,65]. Conversely GD represents the most common cause of hyperthyroidism driven by thyroid-stimulating immunoglobulins (TSI) that activate the TSH receptor leading to excessive thyroid hormone production[6,7].

Epidemiological studies have also documented a rising prevalence of subclinical hypothyroidism (SCH) particularly among women and younger adults with anti-TPO positivity reported in 36–70% of affected cohorts[8,9,25,28,41,42,55,56,61]. This trend underscores the growing burden of thyroid autoimmunity in populations worldwide.

Rheumatoid arthritis (RA) a systemic autoimmune disease primarily affecting synovial joints has been consistently linked with thyroid autoimmunity. Multiple studies demonstrate that RA patients have a significantly higher prevalence of thyroid dysfunction compared to healthy controls with estimates ranging from 14% to 42%[11–19,22–24,26,29–32,35–38,43,44,46,48,49,52,53,58,60,63,64]. Subclinical hypothyroidism emerges as the most common thyroid abnormality in Rheumatoid arthritis populations[13–15,18,19,22,24,26,29–32,35–38,43,44,46,48,49,52,53,58,60,63,64]. Meta-analyses further confirm that RA patients are two- to three-fold more likely to develop hypothyroidism than the general population [16,17,36,37,44]. Importantly recent genetic and epidemiological evidence suggests a bidirectional relationship: Rheumatoid arthritis (RA) increases the risk of hypothyroidism while hypothyroidism itself predisposes individuals to Rheumatoid arthritis (RA)[18,32,36,37,44]. This coexistence is thought to arise from shared immunogenetic backgrounds, alterations in gut microbiota and systemic immune dysregulation[3,13,19–21,26,29,32,36,64], highlighting the interconnected nature of these autoimmune conditions.

Inflammatory markers such as high sensitivity C-reactive protein (hsCRP) and erythrocyte sedimentation rate (ESR) provide valuable insights into the systemic inflammatory burden in both AITD and RA. In subclinical hypothyroidism hsCRP levels are significantly elevated compared to controls for example 2.93 mg/L versus 1.16 mg/L and show positive correlations with TSH levels and lipid abnormalities[14,21–25,33,34,56,59,62]. Similarly Rheumatoid arthritis patients with thyroid dysfunction exhibit elevated ESR and CRP[13,25,26,29,59,60]. Moreover anti-TPO positivity in RA has been associated with higher ESR, CRP, rheumatoid factor (RF) and anti-CCP antibody levels indicating an amplified autoimmune burden [13,17,26,29,39,43,54,59]. These findings emphasize that elevated hsCRP and ESR are not

merely markers of localized disease activity but reflect a broader systemic inflammatory link between thyroid autoimmunity and RA. Clinically this overlap has important implications as it contributes to increased cardiovascular risk worsened disease severity and reduced quality of life in affected patients [18,21,27,36,37,44,64].

Clinical Implications

The coexistence of autoimmune thyroid diseases (AITDs) and rheumatoid arthritis (RA) carries significant clinical consequences particularly when evaluated in the context of inflammatory markers such as high-sensitivity C-reactive protein (hsCRP) and erythrocyte sedimentation rate (ESR). Both conditions share overlapping immunopathological mechanisms including genetic susceptibility immune dysregulation and environmental triggers. When present together they amplify systemic inflammation accelerate disease progression and increase the risk of long-term complications[9,10,26,64].

In patients with subclinical hypothyroidism (SCH) elevated hsCRP and ESR levels provide evidence of persistent low-grade inflammation even in the absence of overt thyroid dysfunction. This chronic inflammatory state correlates positively with thyroid stimulating hormone (TSH) levels and lipid abnormalities thereby contributing to a heightened risk of cardiovascular disease[14,21,25,34,50]. Monitoring hsCRP and ESR in SCH patients is therefore clinically valuable as it allows early identification of individuals at risk for progression to overt hypothyroidism and associated metabolic derangements. Such surveillance can guide timely therapeutic interventions including levothyroxine therapy which has been shown to improve inflammatory[33,47,56].

In RA, thyroid dysfunction particularly SCH has been consistently associated with elevated ESR and CRP values which often correlate with disease activity[16,29,30,38,43]. The presence of thyroid autoimmunity marked by anti-TPO positivity further amplifies systemic inflammation with higher levels of ESR, CRP, rheumatoid factor (RF) and anti-CCP antibodies observed in affected patients[17,24,54]. This compounded autoimmune burden suggests that thyroid autoimmunity may exacerbate RA severity, accelerate joint damage and worsen systemic manifestations such as fatigue, cardiovascular risk and reduced quality of life. Clinically this highlights the importance of integrated screening for thyroid dysfunction in RA patients as untreated thyroid abnormalities may undermine disease control and therapeutic outcomes[15,18,60].

hsCRP and ESR serve not only as markers of localized disease activity but also as indicators of systemic immune dysregulation. Their elevation in both AITD and RA underscores the interconnected nature of these autoimmune conditions and provides a rationale for incorporating them into routine screening protocols. For RA patients assessing thyroid function alongside inflammatory markers can improve risk stratification and guide multidisciplinary management. Similarly in patients with AITD monitoring RA specific antibodies and inflammatory markers may allow earlier detection of coexisting rheumatologic disease[26,33,43].

The integration of hsCRP and ESR into clinical practice enhances the ability to detect, monitor and manage the coexistence of AITD and RA. Early recognition of this overlap can reduce cardiovascular complications, improve disease control and optimize patient outcomes. From a public health perspective these findings emphasize the need for interdisciplinary care strategies that combine endocrinology and rheumatology expertise ensuring comprehensive management of patients with overlapping autoimmune conditions[11–13,62,64].

Management Strategies

The coexistence of autoimmune thyroid diseases (AITDs) and rheumatoid arthritis (RA) requires an integrated and multidisciplinary management approach, particularly when inflammatory markers such as high-sensitivity C-reactive protein (hsCRP) and erythrocyte sedimentation rate (ESR) are elevated. These markers not only reflect localized disease activity but also highlight systemic immune dysregulation making them valuable tools for guiding therapeutic decisions[9,10,26,64].

Screening and Early Detection

Early identification of overlapping autoimmune conditions is essential. Patients with AITDs should undergo routine screening for RA specific antibodies such as anti-CCP and rheumatoid factor (RF) alongside inflammatory markers including hsCRP and ESR to detect early rheumatologic involvement[20,21,25,27,54]. Conversely RA patients should be screened for thyroid dysfunction particularly subclinical hypothyroidism (SCH) using thyroid function tests (TSH, FT4, FT3) and thyroid autoantibodies (anti-TPO, anti-Tg). Elevated hsCRP and ESR in either condition should prompt further evaluation as these markers often precede overt clinical manifestations and may signal systemic autoimmune clustering[15,18,30,60].

Inflammation Control

Controlling systemic inflammation is a cornerstone of management. In SCH levothyroxine therapy has been shown to reduce hsCRP levels and improve lipid abnormalities thereby lowering cardiovascular risk[33,47,56]. In RA disease modifying antirheumatic drugs (DMARDs) and biologics not only reduce joint inflammation but also lower systemic markers such as ESR and CRP improving overall disease control[16,29,38,43]. Patients with dual pathology may require tailored regimens that simultaneously address thyroid autoimmunity and joint inflammation ensuring comprehensive suppression of systemic immune activity[17,24,54].

Risk Stratification and Monitoring

Persistent elevation of hsCRP, ESR and anti-TPO should be incorporated into routine monitoring protocols for patients with RA. Likewise patients with AITD should also be screened with the above mentioned inflammatory markers and anti-CCP in selective cases. In SCH these markers correlate positively with TSH and lipid abnormalities signaling increased risk of progression to overt hypothyroidism and cardiovascular complications[14,21,25,34,50]. In RA elevated ESR and CRP when combined with thyroid autoimmunity (anti-TPO positivity) indicate a compounded autoimmune burden that may exacerbate disease activity and systemic manifestations[17,26,32,54].

Interdisciplinary Care

Optimal management requires collaboration between endocrinologists and rheumatologists. Joint strategies should include cardiovascular risk assessment bone health monitoring and psychosocial support given the impact of systemic inflammation on quality of life[11–13,62,64,66]. Public health strategies should emphasize early screening and integrated care pathways reducing morbidity associated with overlapping autoimmune conditions. This interdisciplinary approach ensures that both thyroid and joint manifestations are addressed in a coordinated manner.

Patient-Centered Approach

Patient education is critical in managing overlapping autoimmune conditions. Individuals should be informed about the systemic nature of autoimmunity and empowered to recognize early symptoms of thyroid dysfunction or RA flare-ups. Lifestyle interventions including diet optimization, smoking cessation and micronutrient balance (iodine, selenium, vitamin D) may help reduce autoimmune activity and systemic inflammation[23,42,69]. Regular follow-up with hsCRP and ESR testing provides objective measures of disease activity and treatment response ensuring timely adjustments in therapy and improving long-term outcomes.

Conclusion

The coexistence of autoimmune thyroid diseases (AITDs) and rheumatoid arthritis (RA) represents a clinically significant overlap within the broader spectrum of autoimmunity. Both conditions are driven by shared pathways such as genetic predisposition, environmental influences and systemic immune dysregulation. When they occur together the impact is magnified systemic inflammation is heightened disease progression is accelerated and the risk of long term complications increases. This clustering of autoimmune conditions underscores the importance of integrated screening and management strategies rather than treating each disease in isolation.

Inflammatory markers particularly high-sensitivity C-reactive protein (hsCRP) and erythrocyte sedimentation rate (ESR) provide crucial insights into the systemic inflammatory burden in both AITD and RA. In subclinical hypothyroidism (SCH) elevated hsCRP and ESR correlate with thyroid stimulating hormone (TSH) levels and lipid abnormalities reflecting a heightened cardiovascular risk and a tendency toward progression into overt hypothyroidism. In RA thyroid dysfunction is consistently associated with higher ESR and CRP values. The presence of thyroid autoimmunity, especially anti TPO positivity further amplifies systemic inflammation with elevated ESR, CRP, rheumatoid factor (RF) and anti CCP antibodies indicating a compounded autoimmune burden.

From a clinical perspective these findings emphasize that hsCRP and ESR are not simply markers of localized disease activity but rather indicators of systemic immune dysregulation. Their integration into routine screening protocols for both AITD and RA patients can enhance risk stratification guide therapeutic interventions and facilitate early detection of coexisting autoimmune conditions. This proactive approach can reduce cardiovascular complications improve disease control and ultimately enhance quality of life.

The overlap between AITD and RA highlights the need for interdisciplinary collaboration. Endocrinologists and rheumatologists must work together to provide comprehensive care ensuring that both thyroid and joint manifestations are addressed in a coordinated manner. Public health strategies should also emphasize early recognition and integrated management pathways to reduce morbidity associated with these overlapping autoimmune conditions.

The coexistence of AITD and RA coupled with elevated hsCRP and ESR reflects a systemic inflammatory link that demands vigilant screening timely intervention and collaborative care. Recognizing and managing this overlap is essential for improving patient outcomes and addressing the broader burden of autoimmune disease.

References:

1. Li P, Wang Q, Yang Y, Ding Z. Autoimmune thyroid disease and human health: a systematic review of Mendelian randomization studies. Front Immunol. 2025 Dec 4;16:1689498. doi: 10.3389/fimmu.2025.1689498. PMID: 41425574; PMCID: PMC12711731.
2. Calcaterra V, Nappi RE, Regalbuto C, De Silvestri A, Incardona A, Amariti R, Bassanese F, Clemente AM, Vinci F, Albertini R, Larizza D. Gender Differences at the Onset of Autoimmune Thyroid Diseases in Children and Adolescents. Front Endocrinol (Lausanne). 2020 Apr 17;11:229. doi: 10.3389/fendo.2020.00229. PMID: 32362875; PMCID: PMC7181383.
3. Fang Y, Zhang X, Huang R, Liu J, Li Z. Gut microbiota and autoimmune thyroid disease: a bidirectional Mendelian randomization study and mediation analysis. Front Microbiol. 2024 Sep 16;15:1443643. doi: 10.3389/fmicb.2024.1443643. PMID: 39351300; PMCID: PMC11439789.
4. Duntas LH. Environmental factors and thyroid autoimmunity. Ann Endocrinol (Paris). 2011 Apr;72(2):108-13. doi: 10.1016/j.ando.2011.03.019. Epub 2011 Apr 20. PMID: 21511233.
5. Martínez-Hernández R, Marazuela M. MicroRNAs in autoimmune thyroid diseases and their role as biomarkers. Best Pract Res Clin Endocrinol Metab. 2023 Mar;37(2):101741. doi: 10.1016/j.beem.2023.101741. Epub 2023 Feb 8. PMID: 36801129.
6. Wrońska, K., Hałasa, M., & Szczuko, M. (2024). The Role of the Immune System in the Course of Hashimoto's Thyroiditis: The Current State of Knowledge. *International Journal of Molecular Sciences*, *25*(13), 6883. https://doi.org/10.3390/ijms25136883
7. Smith TJ. TSHR as a therapeutic target in Graves' disease. Expert Opin Ther Targets. 2017 Apr;21(4):427-432. doi: 10.1080/14728222.2017.1288215. Epub 2017 Feb 6. PMID: 28127991; PMCID: PMC5718165.
8. Carlucci P, Spataro F, Cristallo M, Di Gioacchino M, Nettis E, Gangemi S. Immune-Molecular Link between Thyroid and Skin Autoimmune Diseases: A Narrative Review. J Clin Med. 2024 Sep 20;13(18):5594. doi: 10.3390/jcm13185594. PMID: 39337081; PMCID: PMC11433455.
9. Franco JS, Amaya-Amaya J, Anaya JM. Thyroid disease and autoimmune diseases. In: Anaya JM, Shoenfeld Y, Rojas-Villarraga A, et al., editors. Autoimmunity: From Bench to Bedside [Internet]. Bogota (Colombia): El Rosario University Press; 2013 Jul 18. Chapter 30. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459466/
10. Lee HJ, Li CW, Hammerstad SS, Stefan M, Tomer Y. Immunogenetics of autoimmune thyroid diseases: A comprehensive review. J Autoimmun. 2015 Nov;64:82-90. doi: 10.1016/j.jaut.2015.07.009. Epub 2015 Jul 30. PMID: 26235382; PMCID: PMC4628844.
11. Santos LR, Vasconcelos Bessa I, Gaspar da Rocha A, Neves C, Freitas C, Soares P. Survey on selenium clinical supplementation in autoimmune thyroid disease. Eur Thyroid J. 2023 Feb 8;12(2):e220090. doi: 10.1530/ETJ-22-0090. PMID: 36622057; PMCID: PMC9986388.
12. Vieira IH, Rodrigues D, Paiva I. Vitamin D and Autoimmune Thyroid Disease-Cause, Consequence, or a Vicious Cycle? Nutrients. 2020 Sep 11;12(9):2791. doi: 10.3390/nu12092791. PMID: 32933065; PMCID: PMC7551884.
13. Adapa, V. ., Kada, V. A. ., & Nunna, J. S. G. . (2023). The Microbiome-Thyroid Link: A Review of the Role of the Gut Microbiota in Thyroid Function and Disease. *Journal of Clinical and Pharmaceutical Research*, *3*(3), 4–10. https://doi.org/10.61427/jcpr.v3.i3.2023.89
14. Priya A, Sri B, Bala G, Kannan S. *Exploring Serum Anti thyroid Peroxidase Antibodies and High Sensitivity C reactive Protein as Inflammatory Markers in Subclinical Hypothyroidism: A Compreh-*

ensive Study. Cureus. 2025;17(1):e76906. doi:10.7759/cureus.76906.
15. Shah et al. *Prevalence of AITD in hypothyroidism.* Cureus. 2025.
16. Datta J, Jain S, Jain A, Jain S, Jain S. *Thyroid dysfunction and autoimmunity in RA (Eastern India).* Int J Med Public Health. 2025.
17. Gaber Soliman S, Abd Elaziz Labeeb AA, Abdelfattah Mousa W, Abdalla Eldosoky NS, ElGazzar SF. *Anti-thyroid peroxidase antibodies in rheumatoid arthritis patients: impact on disease activity.* Egypt Rheumatol Rehabil. 2025;52:56. doi:10.1186/s43166-025-00350-4.
18. Kumar MS, Pallivalappil S, Nair AS. *Spectrum of Thyroid Disorders in Rheumatoid Arthritis.* J Assoc Physicians India. 2025;73(4):18–21.
19. Maheshwari V, Gupta BB, Jha RK. *Study of thyroid dysfunction in patients with Rheumatoid Arthritis.* Eur J Cardiovasc Med. 2025;15(8):639–42.
20. Tripolino O, Mirabelli M, Misiti R, et al. *Circulating Autoantibodies in Adults with Hashimoto's Thyroiditis.* Diagnostics. 2024;14:2450. doi:10.3390/diagnostics14212450.
21. Sharma M.K., Pahadiya H.R., Soni P., Mathur A. *A Study of Dyslipidemia and Inflammatory Markers in Subclinical Hypothyroidism.* Int J Pharm Clin Res. 2024;16(3):1721–6.
22. Diab B.A., Obaid F.R. *The Prevalence of Hashimoto's Thyroiditis among RA Patients.* KMJ. 2024;20(1):25-31.
23. Li L, Jiao F, Zhao J, Duan L. *Risk factors of thyroid dysfunction in RA.* Cent Eur J Immunol. 2024;49(2):126-131. doi:10.5114/ceji.2024.140634.
24. Karakiliç G.D., Borman P., Kocaoğlu S., et al. *Hypothyroidism and autoimmune thyroid disorders in RA.* Rom J Intern Med. 2024;62(2):160-167. doi:10.2478/rjim-2024-0002.
25. Gupta G, Sharma P, Kumar P, Itagappa M. *Study on Subclinical Hypothyroidism and its Association with Various Inflammatory Markers.* J Clin Diagn Res. 2015;9(11):BC04-6. (mapped to SCH inflammation entry).
26. Lichtiger A., Fadaei G., Tagoe C.E. *Autoimmune thyroid disease and rheumatoid arthritis: where the twain meet.* Clin Rheumatol. 2024;43:895–905.
27. Tripolino O. et al. *Autoantibody burden in euthyroid HT.* Diagnostics. 2024.
28. Anil Kumar R, Lalitha R, Shetty S.B. *Prevalence of Anti Thyroid Peroxidase Antibody Positivity in Subclinical and Clinical Hypothyroidism.* Int J Med Res Rev. 2024;12(4):109–15.
29. Meher D.K., Singh V., Upadhyay S.K., Singh S. *Assessment of Thyroid Disorders and Autoimmunity in Patients with Rheumatic Diseases.* J Cardiovasc Dis Res. 2023;14(5):2159-2166.
30. Kumar R., Kumari S. *Thyroid dysfunction in RA (Eastern India).* Int J Acad Med Pharm. 2023;6(2):1051-1054.
31. Mathew A.S., Khadir C.A.A., Abraham J. *Thyroid dysfunction among newly diagnosed RA patients.* Int J Acad Med Pharm. 2023;5(3):2140-2143.
32. Duan L., Chen D., Shi Y., et al. *RA and hypothyroidism: bidirectional Mendelian randomization study.* Front Immunol. 2023;14:1146261.
33. Vudu S., Behnke A. *C-reactive Protein Levels in Autoimmune Hypothyroidism Before and After Levothyroxine Treatment.* Cureus. 2023;15(12):e50848.
34. Panda A., Dasmohapatra D.K., Dash A.N., Ekka B. *Elevated hs-CRP in Subclinical Hypothyroidism.* Panacea J Med Sci. 2022;12(1):86-90.
35. Khaleel K.M., Hussain S.K. *Prevalence of thyroid dysfunction and autoantibodies in RA.* Zanco J Med Sci. 2022;26(1):78-87.

36. Liu Y-j., Miao H-b., Lin S., Chen Z. *Association between RA and thyroid dysfunction: meta-analysis.* Front Endocrinol. 2022;13:1015516.
37. Huang C.M., Sung F.C., Chen H.J., et al. *Hypothyroidism risk associated with RA: population-based cohort study.* Medicine. 2022;101(1):e28487.
38. Nazary K., Hussain N., Ojo R., et al. *Prevalence of Thyroid Dysfunction in Newly Diagnosed RA Patients.* Cureus. 2021;13(9):e18204.
39. Jantikar A.M. *Relationship between Anti-TPO antibodies and thyroid dysfunction.* Int J Clin Biochem Res. 2020;7(2):238-242.
40. Singh J., Prabhakar P.K., Neupane N. *Prevalence of TPO antibodies in AITD.* Asian J Pharm Clin Res. 2020;13(12):186-9.
41. Anand P., Gupta P. *Thyroid dysfunction in young adults.* Int J Clin Biochem Res. 2019;6(2):222-5.
42. Farebrother J., Zimmermann M.B., Andersson M. *Excess iodine intake and thyroid function.* Ann N Y Acad Sci. 2019;1446(1):44-65.
43. Waseem M., Shah T., Nadeem M., et al. *Effect of thyroid dysfunction on RA activity.* Int J Res Med Sci. 2019;7:491-5.
44. Li Q., Wang B., Mu K., et al. *Increased risk of thyroid dysfunction among RA patients.* Front Endocrinol. 2019;9:799.
45. Dutta J., Jain S., Jain A., et al. *Anti TPO in clinical and subclinical hypothyroidism.* Int J Clin Biochem Res. 2019;6(3):415-420.
46. Azeem H.A., Alkabeer A., Hashim A.M., et al. *Prevalence of hypothyroidism in RA patients.* Int J Clin Rheumatol. 2019;14(4):151–159.
47. Siriwardhane T., Krishna K., Ranganathan V., et al. *Significance of Anti-TPO as an Early Predictive Marker.* Autoimmune Dis. 2019;2019:1684074.
48. Saqre I., El-Bahnasawy A., Farag S., Bazeed F. *Autoimmune thyroid disease in Egyptian RA patients.* Egyptian Rheumatologist. 2018;41.
49. Debbarma M., Baruah S.M., Das T.K., et al. *Pattern of thyroid dysfunction in RA.* GJRA. 2017;6(11):72-74.
50. Srivastava V.K., Singh H. *Association of TPOAb and dyslipidemia in SCH.* J Family Med Prim Care. 2017;6:63-8.
51. Posselt R.T., Coelho V.N., Pigozzo D.C., et al. *Prevalence of thyroid autoantibodies in SARDs.* Sao Paulo Med J. 2017;135(6):535-540.
52. Tekaya R., Ben Tekaya A., Sahli H., et al. *Relationship between AITD and RA.* J Adv Med Pharm Sci. 2016;7(1):1-6.
53. Atalay S, Tekeoğlu I, Harman H, Uyanık S. *Presence of Thyroid Disorders in Patients with Autoimmune and Autoinflammatory Rheumatic Diseases.* Int Inv J Med Med Sci. 2016;3(3):50-57.
54. Sunitha KG, Ekambaram P. *Study on prevalence of anti-CCP antibodies in patients with newly diagnosed autoimmune subclinical hypothyroidism.* Int J Recent Sci Res. 2016;7(1):8147-50.
55. Lathia T. *Rising prevalence of thyroid disorders.* J Mahatma Gandhi Inst Med Sci. 2015;20:125-7.
56. Gupta G, Sharma P, Kumar P, Itagappa M. *Study on Subclinical Hypothyroidism and its Association with Various Inflammatory Markers.* J Clin Diagn Res. 2015;9(11):BC04-6. doi:10.7860/JCDR/2015/14640.6806.
57. Srinivasa Rao C, Suresh V, Sachan A. *Subclinical hypothyroidism – when to treat?* J Clin Sci Res. 2014;3:81-4.

58. Siddhartha Kumar B, Sivaram Naik G, Mohan A, et al. *Prevalence of thyroid disorders and metabolic syndrome in adult patients with rheumatoid arthritis.* J Clin Sci Res. 2014;3:97–105.
59. Shrivastava et al. *Inflammatory markers in RA and correlation with disease activity.* J Clin Sci Res. 2014.
60. Elattar EA, Younes TB, Mobasher SA. *Hypothyroidism in patients with rheumatoid arthritis and its relation to disease activity.* Egypt Rheumatol Rehabil. 2013;41(2):58-65. doi:10.1016/j.ejr.2013.11.002.
61. Raza SA, Mahmood N. *Subclinical hypothyroidism: Controversies to consensus.* Indian J Endocr Metab. 2013;17:S636-42.
62. Baruah MP, Bhattacharya B. *Significant role of serum CRP in differentiating inflammatory from non-inflammatory causes of thyrotoxicosis.* Indian J Endocr Metab. 2012;16:976-81.
63. Roldan J, Amaya-Amaya J, Castellanos-de la Hoz J, et al. *AITD in Colombian RA patients.* Indian J Endocr Metab. 2012.
64. Cárdenas Roldán J, Amaya-Amaya J, Castellanos-de la Hoz J, et al. *Autoimmune Thyroid Disease in Rheumatoid Arthritis: A Global Perspective.* Arthritis. 2012;2012:864907. doi:10.1155/2012/864907.
65. Ghoraishian S.M., Hekmati Moghaddam S.H., Afkhami Ardekani M. *Relationship Between Anti-Thyroid Peroxidase Antibody And Thyroid Function Test.* Iranian J Immunol. 2006;3(3):146-149.