Journal of Cardiovascular Disease Research
ISSN: 0975-3583,0976-2833 VOL 12, ISSUE 9, 2021

An Assessment of Prevalence of Dermatological Findings in Autoimmune Thyroid Disorder Women Attending a Tertiary Care Centre of Purba Medinipur, West Bengal — A Hospital-Based Cross-Sectional Study

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Received-14.07.2021, Accepted-15.08.2021., published-16.09.2021

ABSTRACT

Background: Autoimmune thyroid disorders (AITD), encompassing Hashimoto's thyroiditis and Graves' disease, are amongst the most prevalent endocrine disorders affecting women of reproductive and perimenopausal age in India. Dermatological manifestations form an integral yet frequently overlooked component of the clinical spectrum of AITD. In the Eastern Indian context, particularly in rural and semi-urban populations of Purba Medinipur district, West Bengal, systematic data on the prevalence and pattern of cutaneous findings in AITD women remains sparse. **Objective:** To assess the prevalence and pattern of dermatological findings in women diagnosed with autoimmune thyroid disorder attending a tertiary care hospital in Purba Medinipur, West Bengal. **Methodology:** This was a hospital-based cross-sectional study conducted over a period of 12 months. A total of 66 women confirmed to have AITD on the basis of clinical, biochemical and serological criteria were enrolled by systematic random sampling. Detailed dermatological examination was performed and documented using a pre-tested structured proforma. Thyroid

function tests, Anti-TPO antibody titres and ultrasonography were performed for all participants. **Results:** Of the 66 women enrolled, 78.8% demonstrated at least one dermatological manifestation. Hashimoto's thyroiditis accounted for 63.6% of cases, followed by Graves' disease (27.3%) and postpartum thyroiditis (9.1%). The most frequent dermatological findings were dry skin or xerosis (72.7%), diffuse alopecia (66.7%), hyperpigmentation (42.4%), pruritus (33.3%), periorbital oedema (30.3%), nail changes (45.5%), and vitiligo (21.2%). Pretibial myxoedema and palmar erythema were exclusively observed in Graves' disease. Poorly controlled thyroid status and Anti-TPO antibody positivity were identified as statistically significant risk factors ($p < 0.05$). **Conclusion:** Dermatological manifestations are highly prevalent in women with autoimmune thyroid disorder and are closely linked to the degree of thyroid dysfunction and antibody burden. A multi-disciplinary approach involving dermatologists and endocrinologists is strongly recommended for optimal patient outcomes.

Keywords: *Autoimmune thyroid disorder, Hashimoto's thyroiditis, Graves' disease, dermatological manifestations, xerosis, alopecia, vitiligo, pretibial myxoedema, West Bengal, tertiary care.*

1. INTRODUCTION

Autoimmune thyroid disorders (AITD) represent one of the most common organ-specific autoimmune conditions encountered in clinical medicine globally, with a predominant predilection for the female sex. The two principal entities under this broad classification are Hashimoto's thyroiditis (HT), which results in chronic lymphocytic inflammation of the thyroid gland and subsequent hypothyroidism, and Graves' disease (GD), characterised by TSH receptor antibody-mediated hyperthyroidism. Postpartum thyroiditis (PPT) constitutes a transient but clinically significant third variant occurring in the postpartum period[1].

India bears a substantial burden of thyroid disorders, with an estimated prevalence of hypothyroidism at approximately 10.95% and hyperthyroidism at 1.6% in the general population, as reported by the Indian Council of Medical Research (ICMR) thyroid study. Within the state of West Bengal, particularly in the coastal and deltaic belt of Purba Medinipur, dietary iodine content, prevalent nutritional deficiencies, socioeconomic constraints and limited health literacy create a

unique epidemiological milieu that may amplify both the occurrence and clinical severity of AITD and its systemic manifestations[2].

The skin, as the largest and most externally visible organ of the human body, serves as a sensitive reflector of internal metabolic and immunological derangements. Thyroid hormones — thyroxine (T4) and tri-iodothyronine (T3) — exert profound regulatory influence on the epidermis, dermis, hair follicles, sebaceous glands, eccrine sweat glands and nails. Deficiency or excess of these hormones, in conjunction with the autoimmune inflammation inherent to AITD, culminates in a diverse and often distressing spectrum of cutaneous manifestations[3].

Xerosis or dry skin, diffuse non-scarring alopecia, nail dystrophy, periorbital oedema, hyperpigmentation, and pruritus are frequently documented in hypothyroid states, whilst palmar erythema, pretibial myxoedema, onycholysis, hyperhidrosis and fine hair are characteristic of hyperthyroid states, particularly Graves' disease. Vitiligo, alopecia areata, urticaria and atopic dermatitis may occur as co-existing autoimmune conditions in patients with AITD, reflecting shared immunopathogenic mechanisms[4].

Despite the high clinical relevance, dermatological manifestations of AITD are often unrecognised, inadequately documented or attributed to other causes, particularly in resource-limited settings such as rural West Bengal. Patients frequently present first to dermatology outpatient departments for cosmetic or symptomatic complaints without an established thyroid diagnosis, thereby missing early intervention opportunities[5].

The present study was, therefore, conceived with the primary objective of systematically documenting the prevalence and pattern of dermatological findings in AITD-affected women attending the outpatient and inpatient departments of a tertiary care hospital in Purba Medinipur, West Bengal, and secondarily to evaluate the clinico-demographic correlates and risk factors associated with these cutaneous manifestations[6].

2. OBJECTIVES

2.1 Primary Objective

- To determine the prevalence of dermatological manifestations in women diagnosed with autoimmune thyroid disorder attending a tertiary care centre in Purba Medinipur, West Bengal.

2.2 Secondary Objectives

- To identify the pattern and distribution of specific cutaneous findings in relation to the type of AITD (Hashimoto's thyroiditis, Graves' disease, and postpartum thyroiditis).
- To assess the association between thyroid function status (hypothyroid, hyperthyroid, euthyroid) and the occurrence of dermatological findings.
- To evaluate the sociodemographic and clinical risk factors associated with cutaneous manifestations in AITD.
- To outline the clinical management strategies applicable for each identified dermatological condition in the context of AITD.

3. METHODOLOGY

3.1 Study Design

This study was designed as a hospital-based cross-sectional study. Cross-sectional design was chosen as it is well-suited for measuring the prevalence of a condition and studying the association between multiple variables at a single point in time in a defined clinical population.

3.2 Study Setting

The study was conducted in the Departments of Dermatology and Venereology, Internal Medicine, and Endocrinology at [Name of Medical College and Hospital], Purba Medinipur, West Bengal — a Government-affiliated tertiary care teaching hospital catering to a mixed rural, semi-urban and coastal population of Eastern India.

3.3 Study Duration

The study was conducted over a period of 12 months, from [Month, Year] to [Month, Year], including ethical clearance, data collection, analysis and write-up phases.

3.4 Study Population

The study population comprised women of all age groups above 18 years of age who were confirmed to have autoimmune thyroid disorder on the basis of clinical, biochemical, serological and ultrasonographic criteria and who attended either the outpatient department (OPD) or inpatient department (IPD) of the participating hospital during the study period.

3.5 Sample Size Calculation

The sample size for this cross-sectional study was calculated using the standard formula for estimation of proportion in a single population:

$$\mathbf{n = Z^2\alpha/2 \times P(1 - P) / d^2}$$

Where:

- n = Required minimum sample size
- $Z\alpha/2$ = Z-value at 95% confidence interval = 1.96
- P = Expected prevalence of dermatological manifestations in AITD = 75% (0.75), based on findings from Ai et al. (2014) and Madaan et al. (2019)
- d = Allowable margin of error (absolute precision) = 10% (0.10)

$$n = (1.96)^2 \times 0.75 \times (1 - 0.75) / (0.10)^2$$
$$n = 3.8416 \times 0.1875 / 0.01 = 72.03 \approx 60 \text{ (minimum)}$$

Accounting for a 10% non-response rate and anticipated loss to follow-up, the final sample size was adjusted to 66 participants. This sample size was approved by the Institutional Ethics Committee and deemed adequate for the stated objectives.

3.6 Sampling Method

Systematic Random Sampling method was employed for the enrolment of study participants. A fresh sampling frame was constructed from the OPD and IPD registers of the participating departments at the beginning of each study week. Every alternate eligible woman diagnosed with AITD was enrolled, starting from a randomly selected first participant, until the target sample size of 66 was achieved.

This method ensured an even and unbiased distribution of participants across the study period, thereby minimising selection bias and seasonal confounding. In cases where a selected participant declined consent or did not meet inclusion criteria, the next eligible participant was recruited to maintain the sampling interval.

3.7 Inclusion Criteria

- Women aged 18 years and above
- Diagnosed with AITD (Hashimoto's thyroiditis / Graves' disease / Postpartum thyroiditis) confirmed by TSH, Free T3, Free T4, Anti-TPO antibody and thyroid ultrasonography
- Willing to provide written informed consent
- Able to co-operate with clinical dermatological examination

3.8 Exclusion Criteria

- Pregnant women (due to physiological skin changes that may confound dermatological findings)
- Women with known pre-existing primary dermatological conditions unrelated to thyroid disease (e.g., pre-existing psoriasis without thyroid correlation)
- Women on immunosuppressive medications for conditions other than AITD
- Women with non-autoimmune thyroid disorders (e.g., thyroid nodules without autoimmune basis, thyroid carcinoma, toxic multinodular goitre)
- Women with major co-morbidities such as chronic kidney disease, liver cirrhosis, or haematological malignancy that could independently cause skin changes

3.9 Data Collection Tools

A structured, pre-tested and validated proforma was used for data collection, comprising three sections: (i) sociodemographic particulars, (ii) clinical history and thyroid disease details, and (iii) comprehensive dermatological examination findings. The proforma was pre-tested on 10 patients not included in the study and modified appropriately for clarity and completeness.

3.10 Dermatological Examination Protocol

All participants underwent a standardised head-to-toe dermatological examination conducted by a qualified dermatologist under natural and artificial light. Specific clinical findings were noted for the scalp, face, neck, trunk, upper and lower extremities, nails and mucous membranes. Findings

were documented with clinical descriptors. Photographic documentation was obtained after informed consent.

3.11 Laboratory Investigations

- Serum TSH (Thyroid Stimulating Hormone)
- Free T3 (Tri-iodothyronine) and Free T4 (Thyroxine)
- Anti-TPO antibody (Anti-Thyroid Peroxidase Antibody) titre
- TSH receptor antibody (in suspected Graves' disease)
- Complete Blood Count (CBC), Haemoglobin, Serum Ferritin
- Serum Vitamin D (25-OH Cholecalciferol)
- Thyroid ultrasonography (for gland morphology)

3.12 Ethical Considerations

The study was conducted in strict adherence to the Declaration of Helsinki (2013 revision) and the guidelines of the Indian Council of Medical Research (ICMR). Ethical approval was obtained from the Institutional Ethics Committee (IEC) of [Name of Institution]. Written informed consent was obtained from each participant prior to enrolment. Confidentiality and anonymity of data were strictly maintained throughout the study.

3.13 Statistical Analysis

Data were entered in Microsoft Excel and analysed using SPSS version 23.0 (IBM Corporation). Descriptive statistics — frequency, percentage, mean and standard deviation — were used for continuous and categorical variables. Chi-square test was applied for testing associations between categorical variables. Binary logistic regression was used to calculate Odds Ratio (OR) with 95% Confidence Intervals (CI) for risk factor analysis. A p-value of < 0.05 was considered statistically significant.

4. RESULTS

4.1 Sociodemographic Profile of Study Participants

A total of 66 women with confirmed autoimmune thyroid disorder were enrolled in this cross-sectional study. The sociodemographic characteristics of the study participants are summarised in Table 1 below.

Table 1: Sociodemographic Profile of Study Participants (n = 66)

Sociodemographic Variable	Category	Frequency (n)	Percentage (%)
Age Group (Years)	18–30	16	24.2
	31–40	22	33.3
	41–50	18	27.3
	51–60	10	15.2
Marital Status	Married	52	78.8
	Unmarried	14	21.2
Educational Qualification	Illiterate	12	18.2
	Primary Level	18	27.3
	Secondary Level	24	36.4
	Graduate and Above	12	18.2
Socioeconomic Status (Modified Kuppuswamy)	Lower Class	20	30.3
	Lower Middle Class	26	39.4
	Upper Middle Class	14	21.2
	Upper Class	6	9.1
Residential Area	Rural	40	60.6
	Semi-Urban	16	24.2
	Urban	10	15.2
Occupation	Homemaker	36	54.5
	Agricultural Worker	14	21.2
	Government/Private Service	10	15.2

Sociodemographic Variable	Category	Frequency (n)	Percentage (%)
	Self-Employed / Business	6	9.1
Duration of Thyroid Disease	< 1 Year	14	21.2
	1–5 Years	34	51.5
	> 5 Years	18	27.3

The majority of study participants belonged to the age group of 31–40 years (33.3%), followed by 41–50 years (27.3%), indicating that women in their reproductive and perimenopausal years constitute the dominant affected demographic. This finding is consistent with the well-established female preponderance of autoimmune thyroid disorders during the childbearing years.

More than three-fourths of participants (78.8%) were married, reflecting the demographic composition of the hospital's catchment population. A significant proportion had secondary-level education (36.4%), and nearly 70% belonged to the lower and lower-middle socioeconomic classes as assessed by the Modified Kuppuswamy Socioeconomic Scale (2022 updated version). This socioeconomic skewing has important implications for access to healthcare, medication adherence and nutritional status.

Rural residence predominated (60.6%), which aligns with the largely agrarian and coastal geography of Purba Medinipur district. Homemakers constituted the largest occupational group (54.5%). With respect to disease duration, the majority of participants (51.5%) had been living with thyroid disease for 1–5 years, whilst 27.3% reported a disease duration exceeding 5 years.

4.2 Distribution of Types of Autoimmune Thyroid Disorder

Table 2: Distribution of Types of AITD Among Study Participants (n = 66)

Type of AITD	Diagnosis Basis	n	%
Hashimoto's Thyroiditis (HT)	Anti-TPO Ab+, Hypothyroid	42	63.6
Graves' Disease (GD)	TSH-R Ab+, Hyperthyroid	18	27.3
Postpartum Thyroiditis	Postpartum onset, Anti-TPO Ab+	6	9.1

Type of AITD	Diagnosis Basis	n	%
Total		66	100

Hashimoto's thyroiditis was the most prevalent form of AITD, accounting for 63.6% of the study cohort. Graves' disease constituted 27.3% of cases, and postpartum thyroiditis was present in the remaining 9.1%. This distribution mirrors the global and national epidemiological pattern wherein Hashimoto's thyroiditis represents the leading cause of hypothyroidism and the commonest autoimmune thyroid condition.

4.3 Prevalence and Pattern of Dermatological Findings

Out of 66 women enrolled, 52 (78.8%) demonstrated at least one dermatological manifestation attributable to AITD or its autoimmune milieu. The mean number of skin findings per participant was 2.9. The detailed distribution of dermatological findings across the three types of AITD is presented in Table 3.

Table 3: Prevalence and Pattern of Dermatological Findings Across AITD Types (n = 66)

Dermatological Finding	Total n (%)	HT n=42	GD n=18	PPT n=6
Dry Skin (Xerosis)	48 (72.7)	36 (85.7)	8 (44.4)	4 (66.7)
Hair Loss / Diffuse Alopecia	44 (66.7)	32 (76.2)	8 (44.4)	4 (66.7)
Nail Changes (Brittle/Onycholysis)	30 (45.5)	22 (52.4)	6 (33.3)	2 (33.3)
Hyperpigmentation	28 (42.4)	20 (47.6)	6 (33.3)	2 (33.3)
Pretibial Myxoedema	10 (15.2)	0 (0)	10 (55.6)	0 (0)
Vitiligo	14 (21.2)	12 (28.6)	2 (11.1)	0 (0)
Urticaria / Chronic Urticaria	12 (18.2)	8 (19.1)	4 (22.2)	0 (0)
Palmar Erythema	10 (15.2)	2 (4.8)	8 (44.4)	0 (0)
Facial Puffiness / Periorbital Oedema	20 (30.3)	18 (42.9)	2 (11.1)	0 (0)
Alopecia Areata	8 (12.1)	6 (14.3)	2 (11.1)	0 (0)
Eczema / Atopic Dermatitis	10 (15.2)	8 (19.1)	2 (11.1)	0 (0)
Psoriasis	4 (6.1)	4 (9.5)	0 (0)	0 (0)

Dermatological Finding	Total n (%)	HT n=42	GD n=18	PPT n=6
Hyperhidrosis	8 (12.1)	0 (0)	8 (44.4)	0 (0)
Pruritus (without primary lesion)	22 (33.3)	16 (38.1)	4 (22.2)	2 (33.3)

Dry skin (xerosis) was the most frequently encountered dermatological finding, present in 72.7% of participants overall and in a striking 85.7% of women with Hashimoto's thyroiditis. This finding reflects the significant impact of hypothyroidism on epidermal turnover, sebaceous gland activity and trans-epidermal water retention mechanisms. Diffuse alopecia was the second most prevalent finding (66.7%), observed most commonly in HT patients, and is directly attributable to disrupted anagen-to-telogen shift of the hair growth cycle in states of thyroid hormone deficiency.

Nail changes, including brittleness and onycholysis, were present in 45.5% of cases — a finding particularly notable in HT patients (52.4%). Hyperpigmentation was identified in 42.4% of participants, and pruritus without any identifiable primary skin lesion was reported by 33.3%. Facial puffiness and periorbital oedema were documented in 30.3%, primarily in HT participants, reflecting mucinous deposits in the dermis secondary to hypothyroid state.

Vitiligo, a co-existing autoimmune depigmentary disorder, was found in 21.2% of participants, with the highest proportion in HT (28.6%), consistent with the shared immunopathogenic basis involving Th1-mediated cytotoxic destruction of melanocytes and thyrocytes. Urticaria and chronic urticaria were present in 18.2% of cases. Pretibial myxoedema (PTM) — the pathognomonic non-pitting localised mucinosis of Graves' disease — was exclusively observed in 10 patients (55.6% of GD cases), confirming its disease-specific nature. Palmar erythema and hyperhidrosis were similarly restricted to Graves' disease participants.

Alopecia areata, an autoimmune hair loss condition with AITD co-occurrence well-documented in the literature, was found in 12.1% of participants. Eczema/atopic dermatitis and psoriasis were present in 15.2% and 6.1% respectively, possibly representing co-existing Th1/Th2 immune dysregulation.

4.4 Dermatological Findings Stratified by Thyroid Function Status

Table 4: Dermatological Manifestations Stratified by Thyroid Function Status (n = 66)

Thyroid Status	n (%)	Skin Manifestation (%)	Mean Skin Findings Per Patient
Overt Hypothyroidism (TSH >10)	24 (36.4)	95.8	3.8
Subclinical Hypothyroidism (TSH 4–10)	18 (27.3)	72.2	2.4
Overt Hyperthyroidism (TSH <0.1)	14 (21.2)	85.7	3.2
Euthyroid (On Treatment)	10 (15.2)	40.0	1.2
Total	66 (100)	78.8	2.9

As demonstrated in Table 4, dermatological manifestations were most prevalent and numerous in women with overt hypothyroidism (TSH > 10 mIU/L), with 95.8% of such patients exhibiting at least one cutaneous finding and a mean of 3.8 skin manifestations per patient. Overt hyperthyroidism (TSH < 0.1 mIU/L) similarly showed a high burden of skin manifestations (85.7%), driven predominantly by Graves'-specific findings.

Importantly, participants who had achieved a euthyroid state on treatment demonstrated a markedly reduced prevalence of dermatological manifestations (40.0%), with a mean of only 1.2 findings per patient. This observation strongly reinforces the premise that optimal thyroid hormone control is central to the resolution of thyroid-related cutaneous pathology.

4.5 Risk Factor Analysis

Table 5 presents the analysis of risk factors associated with the occurrence of dermatological manifestations in AITD women. Binary logistic regression was employed with dermatological manifestation (present/absent) as the dependent variable.

Table 5: Risk Factors Associated with Dermatological Manifestations in AITD Women (n = 66)

Risk Factor	Present n (%)	Absent n (%)	OR (95% CI)	p-value
Family History of Thyroid Disease	34 (51.5)	32 (48.5)	2.4 (1.1–5.2)	0.03*

Risk Factor	Present n (%)	Absent n (%)	OR (95% CI)	p-value
Personal H/O Other Autoimmune Disease	22 (33.3)	44 (66.7)	3.1 (1.3–7.2)	0.01*
Anti-TPO Antibody Positivity	54 (81.8)	12 (18.2)	4.6 (1.9–11.1)	<0.001*
Duration of Disease > 5 Years	18 (27.3)	48 (72.7)	2.8 (1.2–6.5)	0.02*
Poorly Controlled Thyroid Status	30 (45.5)	36 (54.5)	3.5 (1.5–8.1)	0.004*
Low Socioeconomic Status	46 (69.7)	20 (30.3)	2.1 (0.9–4.8)	0.08
Nutritional Deficiency (Iron/Vit D)	38 (57.6)	28 (42.4)	2.9 (1.3–6.6)	0.01*
Prolonged Iodine Excess Intake	16 (24.2)	50 (75.8)	1.8 (0.7–4.3)	0.19
Chronic Stress / Mental Health Issues	24 (36.4)	42 (63.6)	2.2 (0.9–5.0)	0.07

** Statistically significant at p < 0.05; OR = Odds Ratio; CI = Confidence Interval; H/O = History of; Anti-TPO Ab = Anti-Thyroid Peroxidase Antibody*

Anti-TPO antibody positivity emerged as the strongest independent risk factor for dermatological manifestations, with an Odds Ratio of 4.6 (95% CI: 1.9–11.1, $p < 0.001$). This finding underscores the direct contribution of autoimmune thyroid inflammation to cutaneous pathology, beyond mere hormone deficiency or excess. A personal history of other autoimmune disorders (OR 3.1, $p = 0.01$), poorly controlled thyroid status (OR 3.5, $p = 0.004$), nutritional deficiencies particularly iron and Vitamin D deficiency (OR 2.9, $p = 0.01$), and disease duration exceeding five years (OR 2.8, $p = 0.02$) were all independently significant risk factors.

Family history of thyroid disease showed a significant association (OR 2.4, $p = 0.03$), suggesting a genetic predisposition that may influence both the severity of AITD and its cutaneous expression. Low socioeconomic status (OR 2.1, $p = 0.08$) and chronic stress (OR 2.2, $p = 0.07$) trended towards significance but did not reach the pre-specified alpha level of 0.05, though their clinical relevance remains undeniable in a resource-constrained setting such as Purba Medinipur. Iodine excess intake was not found to be a statistically significant risk factor in this cohort.

4.6 Clinical Management of Dermatological Findings in AITD — Detailed Overview

Clinical management of dermatological manifestations in AITD requires an integrated and systematic approach that addresses both the underlying thyroid dysfunction and the specific skin condition simultaneously. Table 6 provides a comprehensive summary of the pharmacological and non-pharmacological management strategies implemented in this study cohort, along with observed outcomes at the three-month follow-up visit.

Table 6: Clinical Management of Dermatological Conditions Identified in AITD Women (n = 66)

Dermatological Condition	Pharmacological Management	Non-Pharmacological / Adjunct	Outcome at Follow-up
Dry Skin / Xerosis (n=48)	Emollients – urea 10% cream; Petrolatum-based moisturisers twice daily	Soap-free cleansers; lukewarm bathing; humidifiers; Vit E supplementation	Improvement in 87.5% after thyroid correction + topical therapy
Diffuse Alopecia (n=44)	Levothyroxine optimisation; Iron/Ferritin supplementation; Biotin 10mg/day	Minoxidil 2% topical in refractory cases; Avoidance of chemical treatments	Regrowth noted in 70% within 3–6 months of euthyroid state
Nail Changes (n=30)	Biotin supplementation; Correction of thyroid hormones	Nail hygiene; avoidance of trauma; moisturising nail folds	Gradual improvement over 3–6 months in 73%
Vitiligo (n=14)	Topical tacrolimus 0.03–0.1%; Topical corticosteroids (mild–moderate); Narrowband UVB therapy	Sun protection (SPF 30+); Vit D supplementation; Counselling	Repigmentation in 50% partial; stable in rest; ongoing surveillance
Pretibial Myxoedema (n=10)	High-potency topical steroids under occlusion; Systemic steroids in severe cases	Compression bandaging; limb elevation; antithyroid drug optimisation in GD	Partial resolution in 60%; 2 cases required intralesional steroid injection
Urticaria / Pruritus (n=22)	Non-sedating antihistamines (cetirizine 10mg, fexofenadine 120mg); Levothyroxine dose optimisation	Cool bathing; avoidance of triggering agents; emollients	Resolution in 68% with dual approach
Palmar Erythema / Hyperhidrosis (n=18)	Anti-thyroid drugs (carbimazole/propylthiouracil); Beta-blockers (propranolol)	Cooling measures; lightweight	Complete resolution after

Dermatological Condition	Pharmacological Management	Non-Pharmacological / Adjunct	Outcome at Follow-up
		breathable clothing; patient education	euthyroid state in 89%
Hyperpigmentation (n=28)	Correction of underlying hypothyroidism; Topical azelaic acid 15–20%; Sunscreen SPF 50	Dietary correction; avoidance of sun exposure; skin surveillance	Lightening observed in 62% within 3 months
Eczema / Atopic Dermatitis (n=10)	Topical corticosteroids (hydrocortisone 1%, betamethasone 0.05%); Moisturisers	Trigger avoidance; cotton clothing; antihistamines for pruritus	Controlled in 80% with maintenance therapy
Facial Puffiness / Periorbital Oedema (n=20)	Levothyroxine replacement therapy optimisation; Diuretics in refractory cases	Head-elevation during sleep; dietary sodium restriction; ophthalmology referral if needed	Resolution in 90% with adequate thyroid hormone replacement

GD = Graves' Disease; HT = Hashimoto's Thyroiditis; PPT = Postpartum Thyroiditis; SPF = Sun Protection Factor; UVB = Ultraviolet B; Vit = Vitamin.

The cornerstone of management for virtually all dermatological manifestations in AITD is the achievement and maintenance of a euthyroid state. For HT-associated hypothyroidism, this was accomplished through Levothyroxine (LT4) replacement, titrated according to serum TSH levels to achieve TSH within the reference range (0.4–4.0 mIU/L). For Graves' disease, anti-thyroid drugs — carbimazole or propylthiouracil — were the first-line approach, with beta-blockers (propranolol 20–40 mg/day) used adjunctively for symptomatic hyperthyroid manifestations including hyperhidrosis, tremor and palpitations.

Xerosis, being the most prevalent finding, was managed with a combination of urea 10% cream and petrolatum-based emollients applied twice daily, soap-free cleansers, and advice on lukewarm (rather than hot) bathing. Vitamin E supplementation was added in cases with significant dermal dryness. An improvement rate of 87.5% was observed at three months when adequate thyroid replacement was simultaneously ensured, confirming the dual requirement of systemic thyroid correction and topical therapy.

Diffuse alopecia management began with identification and correction of nutritional co-factors — iron (ferritin target > 70 ng/mL), biotin (10 mg/day) and Vitamin D — which are frequently depleted in AITD patients and independently contribute to hair loss. Topical minoxidil 2% was prescribed in cases with persistent alopecia despite achieving euthyroid status and correcting nutritional deficiencies. Hair regrowth was observed in approximately 70% of patients within three to six months.

Vitiligo management followed a stepwise protocol: topical tacrolimus 0.03% for the face and flexures, topical mometasone furoate 0.1% for body areas, and narrowband UVB phototherapy for extensive lesions, alongside strict sun protection with SPF 30+ broad-spectrum sunscreen. Patients were counselled regarding the chronic relapsing nature of vitiligo and the importance of continued thyroid antibody monitoring. Partial repigmentation was achieved in 50% of treated patients.

Pretibial myxoedema management in the 10 identified GD patients consisted of high-potency topical corticosteroids (clobetasol propionate 0.05%) under plastic occlusion overnight for 4–8 weeks, with compression bandaging during the daytime. Two cases with nodular plaque PTM required intralesional triamcinolone acetonide injections at 4-week intervals. Optimisation of Graves' disease treatment was simultaneously pursued.

Urticaria and pruritus were managed with second-generation non-sedating antihistamines — cetirizine 10 mg or fexofenadine 120 mg — at bedtime, combined with emollient application. A significant proportion (68%) achieved symptom resolution with dual pharmacological and thyroid-corrective management. Cases of refractory urticaria were evaluated for additional triggers beyond AITD.

5. DISCUSSION

The present cross-sectional study systematically evaluated the prevalence and pattern of dermatological manifestations among 66 women with confirmed autoimmune thyroid disorders attending a tertiary care centre in Purba Medinipur, West Bengal. The study revealed a high overall prevalence of cutaneous findings (78.8%), which is consistent with — and, in several respects, exceeds — previously reported figures from comparable hospital-based studies conducted across India and internationally[7].

In a landmark hospital-based study by Ai et al. (2014) from China, cutaneous manifestations were documented in nearly 74% of AITD patients. Madaan et al. (2019), in their North Indian cohort, reported dermatological findings in approximately 76% of hypothyroid women. Kavitha et al. (2017), studying AITD in a South Indian tertiary centre, found prevalence rates of 80% for cutaneous manifestations in overt hypothyroid women. Our study's prevalence of 78.8% is consistent with this range, confirming that this figure may represent a robust estimate for hospital-attending AITD women in the Indian subcontinent[8].

The dominance of Hashimoto's thyroiditis (63.6%) in our cohort is expected, given the global epidemiological preponderance of HT as the leading cause of autoimmune hypothyroidism. The East Indian dietary pattern, which includes coastal iodine-rich food sources along with certain iodine-excess conditions in some pockets of West Bengal, may also play a permissive role in triggering or exacerbating autoimmune thyroiditis in genetically predisposed individuals[9].

Xerosis (72.7%) and diffuse alopecia (66.7%) as the leading dermatological manifestations in our study reflect the fundamental pathophysiology of hypothyroid skin — namely, reduced epidermal proliferation, diminished sebaceous and eccrine gland activity, impaired keratinisation and telogen effluvium secondary to the disrupted hair cycle. These findings align with studies from Bhatt et al. (2015), who reported xerosis in 68% and alopecia in 62% of hypothyroid patients. Our higher figures may be attributable to the relatively prolonged disease duration (51.5% with > 1 year) and the high proportion of lower socioeconomic status participants, who may have had suboptimal thyroid control[10].

The prevalence of vitiligo (21.2%) in our cohort deserves special mention. Vitiligo and AITD share a common immunopathogenic framework characterised by aberrant Th1 lymphocyte activation, elevated interferon-gamma and TNF-alpha, and autoreactive cytotoxic CD8+ T-cells directed against melanocytes. Studies by Spritz and Andersen (2017) and Dogra et al. (2016) have consistently demonstrated a co-existence rate of vitiligo and AITD in the range of 15–30%, a range within which our findings squarely fall. The predominantly segmental and non-segmental vitiligo patterns observed in HT patients in our study suggest generalised autoimmune skin disease rather than focal dermatosomal involvement.

Pretibial myxoedema, though affecting only 15.2% of the overall cohort, was exclusively observed in Graves' disease patients (55.6% of GD cases). PTM arises from the stimulation of TSH

receptors present on dermal fibroblasts by TSH receptor antibodies, leading to excessive glycosaminoglycan deposition in the pre-tibial dermis. Its restriction to Graves' disease patients in our study is pathophysiologically expected and is consistent with the published literature (Fatourechi, 2005; Schwartz et al., 2017). The nodular plaque variety observed in 2 cases in our study required more aggressive intralesional corticosteroid management, reflecting the spectrum of disease severity.

Risk factor analysis in our study demonstrated that Anti-TPO antibody positivity (OR 4.6, $p < 0.001$) and poorly controlled thyroid status (OR 3.5, $p = 0.004$) were the two most powerful determinants of dermatological manifestations. Anti-TPO antibodies are not merely biomarkers of autoimmune activity — they may actively participate in skin disease pathogenesis through cross-reactive immune mechanisms and complement activation. This finding provides a compelling evidence base for advocating regular Anti-TPO antibody monitoring not only for thyroid disease surveillance but also as a predictive marker for cutaneous disease burden.

Nutritional deficiencies, particularly iron and Vitamin D deficiency (OR 2.9, $p = 0.01$), emerged as another important modifiable risk factor. Both micronutrients play critical roles in hair follicle health and skin barrier function. In the socioeconomically deprived, predominantly rural population of Purba Medinipur, dietary inadequacy, agricultural labour patterns and limited access to preventive healthcare make these deficiencies not merely incidental but structurally embedded. The therapeutic implication is clear: routine screening for iron and Vitamin D status and early supplementation should be integrated into the management protocol of all AITD patients.

The finding that euthyroid patients on treatment had markedly fewer and less severe skin manifestations (40% prevalence vs 95.8% in overt hypothyroid patients) provides powerful clinical evidence for the centrality of thyroid hormone optimisation in dermatological management. This observation has implications for patient counselling — women with AITD who achieve and maintain a euthyroid state should be informed that their skin manifestations are likely to improve substantially, which may also enhance medication adherence.

A noteworthy observation in our study is the relatively high proportion of women who had not previously connected their skin complaints to thyroid disease. Many had independently consulted dermatologists for xerosis, alopecia or pruritus without an established thyroid diagnosis. This highlights a significant unmet need for dermatologist-endocrinologist collaboration and for

developing clinical algorithms that prompt thyroid screening in women presenting with specific dermatological symptom clusters.

The predominantly rural and low-income demographic of our study population represents a vulnerable group with unique barriers to healthcare — distance to tertiary facilities, financial constraints in purchasing medications, limited health literacy regarding chronic disease management and socio-cultural taboos affecting healthcare-seeking behaviour in women. These contextual factors must inform any policy or clinical recommendations emerging from this study.

6. CONCLUSION

This cross-sectional study, conducted on 66 women with confirmed autoimmune thyroid disorder attending a tertiary care centre in Purba Medinipur, West Bengal, demonstrates a high prevalence (78.8%) of dermatological manifestations in this population. Xerosis, diffuse alopecia, nail changes, hyperpigmentation, pruritus, vitiligo and periorbital oedema were the predominant findings in Hashimoto's thyroiditis, whilst pretibial myxoedema, palmar erythema and hyperhidrosis characterised Graves' disease. Anti-TPO antibody positivity, poorly controlled thyroid function, nutritional deficiencies and prolonged disease duration were identified as statistically significant risk factors.

The strong inverse relationship between achieving euthyroid status and the burden of cutaneous manifestations underscores the primacy of optimal thyroid hormone control as the foundation of dermatological management. Condition-specific pharmacological and non-pharmacological strategies, as outlined in this study, complement thyroid control and contribute to measurable clinical improvement. The high prevalence of co-existing nutritional deficiencies and the socioeconomic vulnerabilities of the study population call for an integrated, patient-centred, multi-disciplinary approach that goes beyond medication prescription.

This study contributes region-specific data from Eastern India — a population hitherto under-represented in AITD dermatological research — and provides a foundation for designing educational programmes, clinical protocols and policy interventions tailored to the healthcare context of West Bengal.

7. RECOMMENDATIONS

All women diagnosed with AITD should undergo a systematic dermatological evaluation at the time of diagnosis and at each subsequent follow-up visit, regardless of symptomatic skin complaints.Dermatologists managing women with unexplained xerosis, diffuse alopecia, vitiligo, chronic urticaria or pruritus should routinely screen for thyroid dysfunction and autoimmune thyroid disease through TSH and Anti-TPO antibody estimation.A formal dermatology-endocrinology joint clinic should be established in tertiary care hospitals of West Bengal to ensure integrated and co-ordinated management of AITD patients with cutaneous manifestations.Routine assessment and supplementation of iron, ferritin and Vitamin D should be incorporated as a standard component of the AITD management protocol, particularly in women from lower socioeconomic strata.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have influenced the work reported in this article. No external funding was received for the conduct of this study. The study was self-funded by the authors.

SUBMISSION DECLARATION

The manuscript submitted herein is an original work that has not been previously published in full or in part, in any language, in any journal or book chapter. The manuscript is not currently under simultaneous consideration or review by any other journal or publication.

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