

Prevalence of Skin Manifestations in Thyroid Disorders

Hana Hafalish^{1*} , Fayizah Ali² 

¹Dermatology Department, College of Medicine, Omer Al-Mukhtar University, Al-Bayda, Libya

²Medicine Department, College of Medicine, Omer Al-Mukhtar University, Al-Bayda, Libya

Email: hussinhafa@yahoo.com

Abstract

The skin, hair, and nails are strongly influenced by thyroid hormone activity, so disturbances in thyroid function frequently translate into a wide range of dermatological signs. This cross-sectional study set out to determine how often such skin, hair, and nail changes occur among patients with thyroid disease and to examine whether these changes track with the type of thyroid disorder, patient age, or sex. Fifty consecutive patients with a diagnosis of hypothyroidism or hyperthyroidism were enrolled; individuals under 18 years of age, pregnant or lactating women, and anyone with a separate known endocrine disorder were not eligible. Data were gathered through a structured questionnaire addressing demographic characteristics, thyroid disease category, dermatological findings, and personal and family medical history, and associations were tested using the chi-square test, with a p-value below 0.05 taken as significant. Participants were predominantly older (44% aged ≥ 46 years) and female (64%), and hypothyroidism accounted for 60% of cases versus 40% for hyperthyroidism. Pruritus was the single most common complaint overall (70%), followed by brittle nails (64%) and hair loss (62%). Within the hypothyroid group, cold intolerance and periorbital puffiness topped the list (96.7% each), with rough, dry skin and dry, brittle hair close behind (93.3% each), then scalp hair loss (90%) and itching (86.7%). Among hyperthyroid patients, excessive sweating, heat intolerance, and facial or chest flushing were each present in 95% of cases. Several dermatological findings — rough dry skin, pale or yellowish skin, flushing, skin color change, temperature intolerance, excessive sweating, scalp hair loss, eyebrow loss, dry brittle hair, itching, facial or periorbital swelling, and finger clubbing — differed significantly by thyroid disease type ($p < 0.05$), and several findings also varied significantly by age and by sex. Overall, hypothyroidism and hyperthyroidism produce distinct, recognizable patterns of skin, hair, and nail involvement, and attention to these signs can support earlier identification of thyroid dysfunction and more complete patient evaluation.

Keywords. Prevalence, Skin Manifestations, Thyroid Disorders.

Introduction

Thyroid hormones, T3 and T4, circulate throughout the body and regulate cellular activity in numerous organs, and the skin is one of the tissues most sensitive to this influence. When thyroid function goes awry, the resulting hormonal imbalance can show up as a wide range of skin problems, and comparable changes are frequently seen in the hair and nails. Hypothyroidism, hyperthyroidism, and thyroid malignancy can each produce their own pattern of cutaneous findings, and marked thyroid hormone imbalance is generally reflected somewhere on the skin. A clinician who recognizes these cutaneous clues can reach a thyroid diagnosis more quickly, since confirmation is readily available through standard thyroid function testing [1]. The skin is not simply the body's largest organ; it also functions as an active immune tissue and a peripheral neuroendocrine structure, closely linked to the rest of the endocrine system, and it contributes in its own right to hormonal homeostasis [2].

Skin changes often precede other systemic signs of thyroid hormone imbalance, so recognizing cutaneous findings can be an early route to a thyroid diagnosis. Thyroid hormone is essential for normal tissue function generally, and in the skin specifically it drives proteoglycan synthesis by acting on fibroblasts and helps regulate epidermal differentiation, partly through effects on keratinocytes [3]. Graves' disease is by far the most common cause of hyperthyroidism, with thyroiditis, toxic multinodular goiter, toxic adenoma, and exogenous thyroid hormone intake accounting for most remaining cases [4,5]. Iodine deficiency remains the leading cause of hypothyroidism worldwide, though it is an uncommon cause in places such as the United States, where dietary iodine — chiefly from iodized table salt — is routinely supplemented; there, Hashimoto's autoimmune thyroiditis is the predominant cause instead. Other recognized causes include prior thyroidectomy, radiation exposure, fibrosis from infiltrative disease, pituitary dysfunction, and other forms of thyroiditis, along with certain medications, most notably thionamides, lithium, and amiodarone [6]. The generalized metabolic slowdown of hypothyroidism produces a fairly characteristic skin picture: coarse, dry, thin, scaly skin, often pale with a yellowish tinge from carotenemia. Some patients also develop non-pitting edema, thickened palms and soles, acquired ichthyosis, or myxedema, and vitiligo may coexist given the autoimmune tendencies seen in thyroid disease. Hair changes are just as common — dryness, brittleness, coarseness, trichodystrophy, diffuse shedding, and telogen effluvium have all been described — and loss of the lateral third of the eyebrow, known as madarosis, is a classic sign [7].

Nails in hypothyroid patients tend to be dull, thin, brittle, and slow-growing, rounding out the picture of slowed metabolism [8]. Hyperthyroidism, by contrast, produces cutaneous signs of an accelerated metabolic state: skin that is warm, smooth, and moist from increased blood flow and sweating. Autoimmune thyroid disease in particular can bring on pretibial myxedema and thyroid acropachy [9]. Scalp hair becomes fine and soft, sometimes with diffuse thinning or the banded pili annulati pattern, while nails soften, become fragile, and may separate from the nail bed — onycholysis, or Plummer's nails — with Lindsay's nails and Terry's nails also reported, underscoring just how broadly thyroid dysfunction can affect the skin

and its appendages [1]. This study set out to determine how frequently skin findings occur among patients with thyroid disease

Methods

Study design and population

Fifty participants with a diagnosis of hypothyroidism or hyperthyroidism were enrolled in this cross-sectional study. Ethical approval was secured before enrollment began (NBC:007.H.26.94), after which a physician completed a structured questionnaire for each participant. Every participant provided written informed consent once the study's aims, procedures, and protocol had been explained to them in detail.

Inclusion criteria

All of the consenting participants needed to be 18 years of age or older and to have a diagnosis of either hypothyroidism or hyperthyroidism.

Exclusion criteria

Individuals younger than 18, those with a separate known endocrine disorder, and pregnant or lactating women were not eligible for the study.

Data collection

Each participant underwent a clinical examination, with findings recorded on the skin-manifestation questionnaire

Data analysis

Collected data were entered into SPSS version 20, and chi-square tests were then used to analyse the results.

Results

Findings from the thyroid-related skin manifestations questionnaire are presented below by study objective and questionnaire section — demographic details, thyroid disorder type, skin manifestations, and family or medical history. Associations between thyroid disease type, age group, sex, and the presence of skin findings were tested with the chi-square test, taking a p-value below 0.05 as significant.

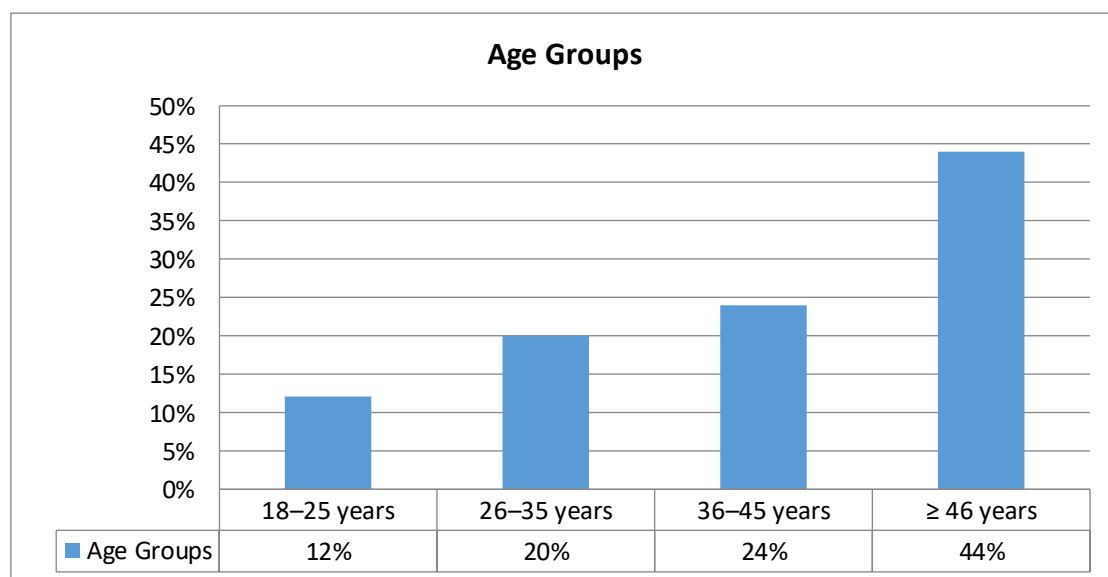


Figure 1. Percentage Distribution of Participants According to Age Groups

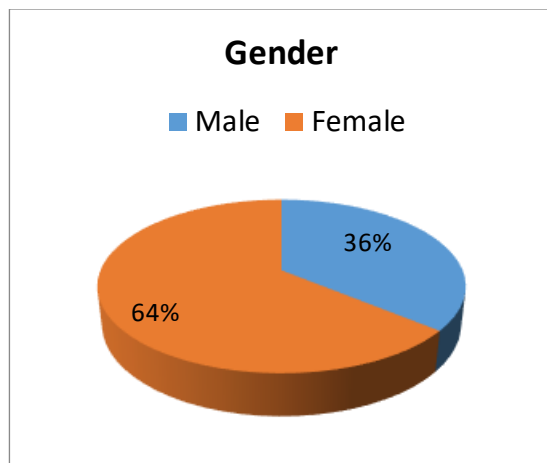


Figure 2. Distribution of Participants According to Gender

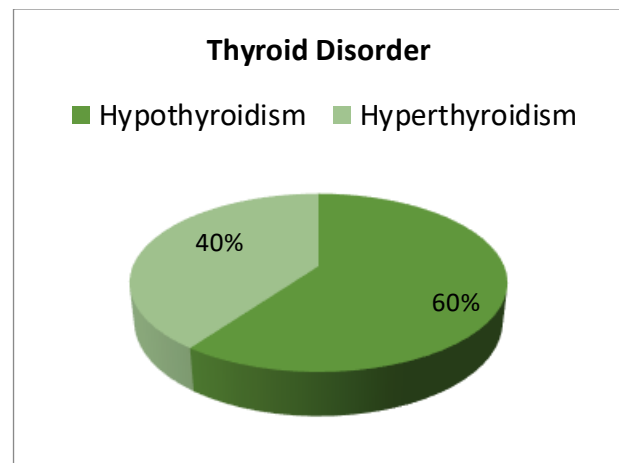


Figure 3. Prevalence of Thyroid Disorders Among Participants

Figures 1 through 3 summarize the demographic and clinical profile of the sample. Patients aged 46 and above formed the largest group (44%), followed by those 36–45 years (24%) and 26–35 years (20%), while the 18–25 age bracket was smallest at 12%. Women outnumbered men, 64% versus 36%, and hypothyroidism was more common than hyperthyroidism, 60% versus 40%. Taken together, the sample skewed toward older, female patients with hypothyroidism — a pattern broadly consistent with what is typically seen in thyroid disease populations.

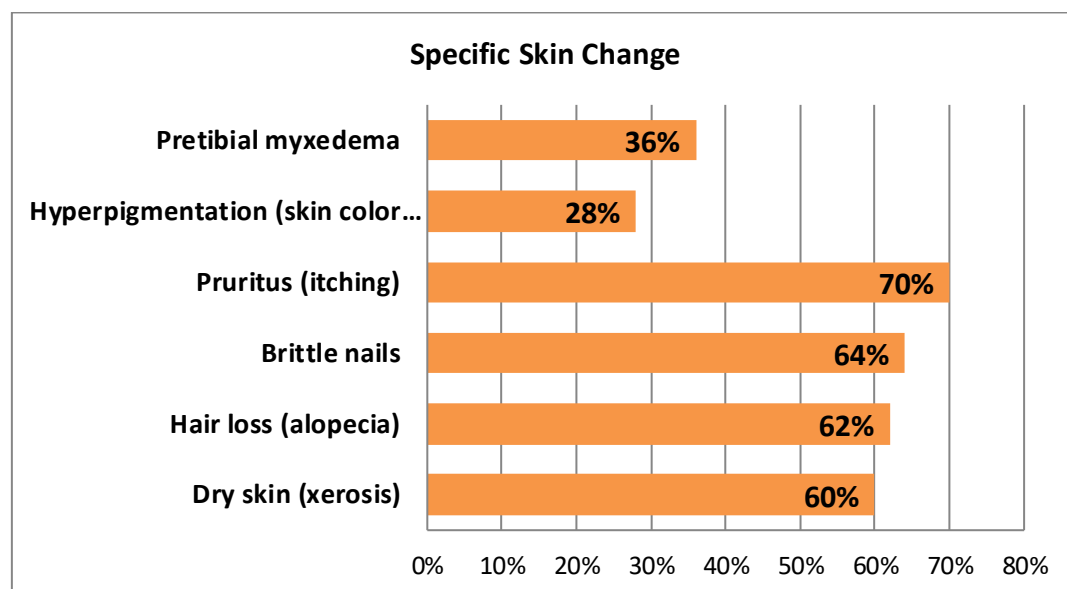


Figure 4. Prevalence of Specific Skin Changes among Patients with Thyroid Disorders

Pruritus emerged as the most commonly reported skin change (70%), followed by brittle nails (64%) and hair loss (62%).

Hyperpigmentation-related skin-color change was comparatively uncommon, reported in just 28% of the sample.

Table 1. Distribution of Clinical and Medical History of Participants

Variable	Category	Frequency (n)	Percentage (%)
Family history of thyroid disease	Yes	30	60%
	No	20	40%
Autoimmune diseases	Yes	22	44%
	No	28	56%

A positive family history of thyroid disease was reported by 60% of participants, with the remaining 40% reporting none

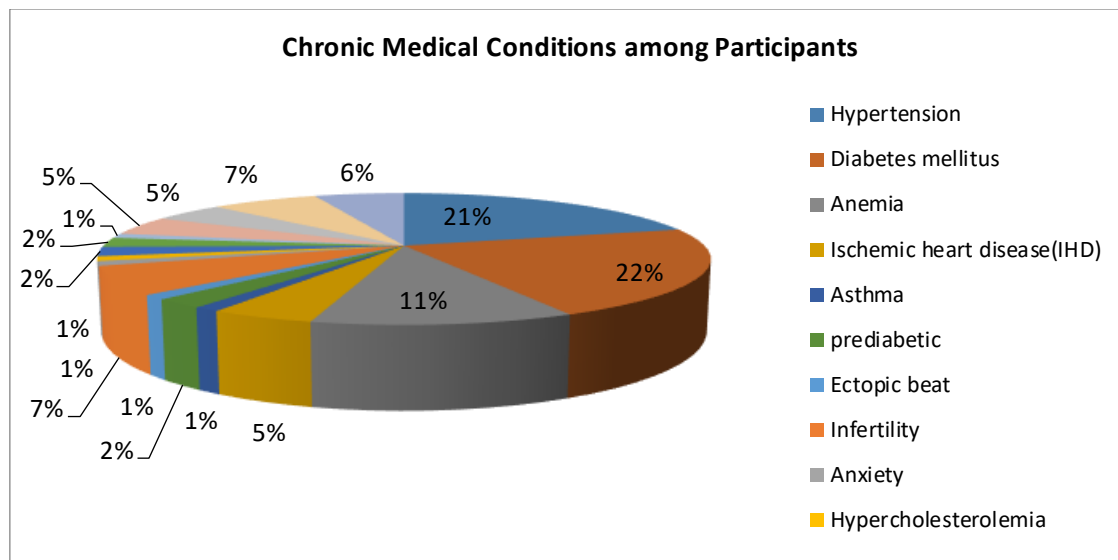


Figure 5. Distribution of Chronic Medical Conditions among Participants

Diabetes mellitus was the leading comorbidity (38%), followed by hypertension (36%) and anemia (20%). Infertility and weight loss were each reported by 12% of patients, while ischemic heart disease, arthritis, and weight gain were each present in 8%. Less common conditions, each affecting 2–4% of the sample, included prediabetes, vitiligo, chronic constipation, asthma, anxiety, gastritis, elevated cholesterol, and ectopic beats.

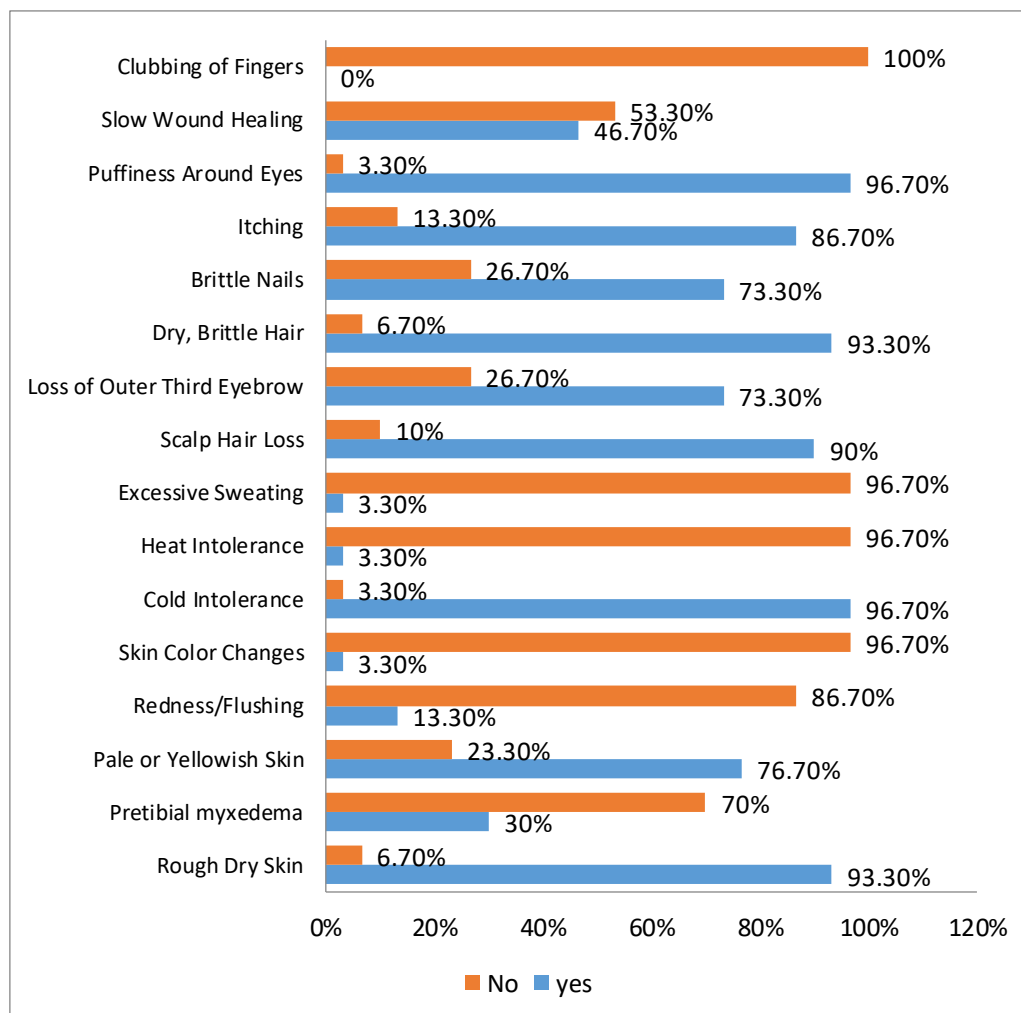


Figure 5 A. Prevalence of Dermatological Manifestations among Patients with Hypothyroidism

Cold intolerance and periorbital puffiness were the most commonly reported findings, each present in 96.70% of the hypothyroid group, closely followed by rough dry skin and dry, brittle hair (93.30% each), scalp hair loss (90.00%), and generalized itching (86.70%). Somewhat less prevalent were pale or yellowish skin (76.70%), brittle nails (73.30%), loss of the outer third of the eyebrow (73.30%), and slow wound healing (46.70%). Findings more typical of hyperthyroidism were rare or absent in this group: pretibial myxedema occurred in 30.00%, redness or flushing in 13.30%, and excessive sweating, heat intolerance, and skin color change in only 3.30% each, while no patient showed clubbing of the fingers (0.00%).

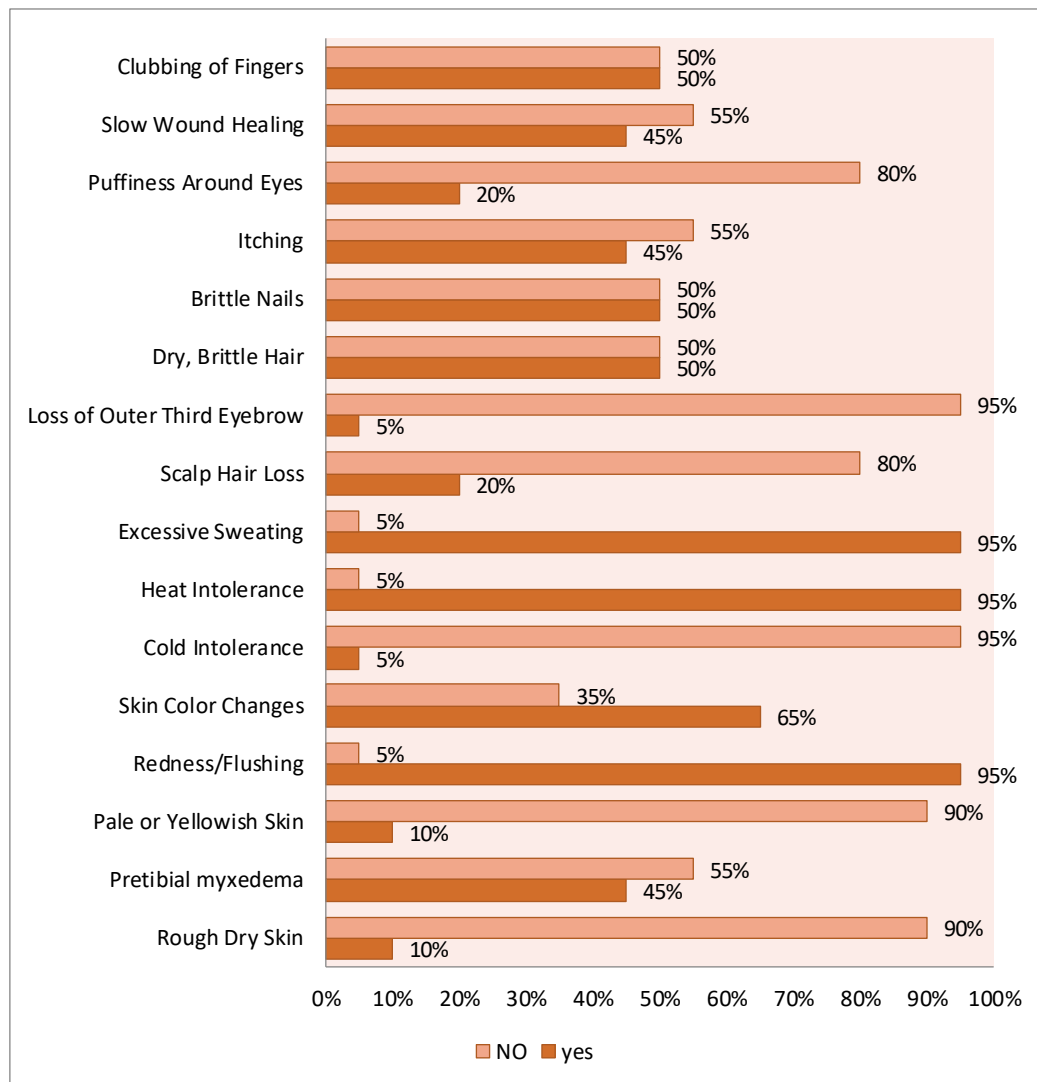


Figure 6 B. Prevalence of Dermatological Manifestations among Patients with Hyperthyroidism

Excessive sweating, heat intolerance, and redness or flushing were each present in 95% of the hyperthyroid group, and skin color change was seen in 65%. Findings more characteristic of hypothyroidism were correspondingly uncommon here — rough dry skin and pale or yellowish skin in only 10%, and cold intolerance in just 5%. Clubbing of the fingers, brittle nails, and dry, brittle hair each occurred in exactly half of the patients, while pretibial myxedema, slow wound healing, and itching were each reported by 45%.

Patient age was significantly associated with rough dry skin, redness or flushing, cold intolerance, heat intolerance, excessive sweating, and loss of the outer third of the eyebrow ($p < 0.05$). Thyroid disease type, in turn, was significantly associated with an even broader set of findings — rough dry skin, pale or yellowish skin, redness or flushing, skin color changes on the legs and feet, heat or cold intolerance, excessive sweating, loss of the outer third of the eyebrow, dry or brittle hair, itching, puffiness or swelling around the eyes or face, and clubbing of the fingers ($p < 0.05$) — though pretibial myxedema, brittle nails, and slow wound healing showed no such association with disease type. Patient sex was likewise significantly associated with rough dry skin, pale or yellowish skin, redness or flushing, skin color changes, cold intolerance, heat intolerance, excessive sweating, scalp hair loss, loss of the outer third of the eyebrow, dry or brittle hair, puffiness or swelling around the eyes or face, and clubbing of the fingers.

Table 2. Comparison of p-values for age, gender, and thyroid type related to skin manifestation

Variables	Thyroid Disease Type (p-value)	Age p-value	Sex p-value
Rough Dry Skin	0.000	0.049	0.000
Pretibial myxedema	0.217	0.123	0.122
Pale or yellowish skin	0.000	0.195	0.003
Redness or Flushing of the Face/Chest	0.000	0.016	0.001
Skin Color Changes on the Legs/Feet	0.000	0.526	0.000
Cold Skin or Intolerance to Cold Temperatures	0.000	0.049	0.000
Heat Intolerance (Warm, Moist Skin without Physical Activity)	0.000	0.049	0.000
Excessive Sweating	0.000	0.049	0.000
Scalp Hair Loss	0.000	0.084	0.002
Loss of the Outer Third of the Eyebrow	0.000	0.007	0.002
Dry, Brittle Hair	0.001	0.153	0.011
Brittle Nails	0.092	0.688	0.351
Itching (Pruritus)	0.002	0.370	0.095
Puffiness/Swelling around Eyes/Face	0.000	0.123	0.000
Slow Wound Healing	0.908	0.303	0.869
Clubbing of Fingers	0.000	0.677	0.001

Discussion

The sample skewed older (46 years or above) and female (64% versus 36% male), consistent with typical thyroid -disease demographics. Hypothyroidism was associated with a substantially greater overall burden and a broader range of skin, hair, and nail findings than hyperthyroidism, which instead presented with a narrower set of pronounced clinical signs — excessive sweating, heat intolerance, and flushing — reflecting the hypermetabolic, hypervascular state of thyrotoxicosis. A study from Ankara, Turkey similarly reported that at least one skin finding was present in more than half of thyroid patients, though in that cohort skin manifestations were actually more frequent in hyperthyroidism than hypothyroidism [10]. Our own findings differ in this respect: pruritus, rather than chronic urticaria, was the most prevalent skin manifestation in our cohort, whereas the Turkish study identified chronic urticaria as the most frequent finding across their sample [10]. A Canadian study reported a similar pattern: among 624 patients with idiopathic chronic urticaria and angioedema, 90 showed evidence of concurrent thyroid autoimmunity [11].

In addition, an Indian study similarly found urticaria in five patients — one acute and four chronic [12]. In our cohort, heat intolerance and hyperhidrosis characterized hyperthyroidism, while dryness was common in hypothyroidism (93%); brittle nails affected more than two-thirds of hypothyroid patients and roughly half of hyperthyroid patients. By comparison, the Indian study found dry skin in the majority of patients (59.37%) and likewise described nails that were brittle, thickened, and slow-growing [12]. Skin pigmentation changes were reported by 65% of our patients, whereas the Indian study described this as an uncommon complaint, present in only 37.5% of their patients [12]. More than half of our participants reported a positive family history of thyroid disorders, pointing to a possible role for familial predisposition in this population. In addition, 90% of patients had at least one chronic comorbid condition, most commonly cardiometabolic in nature — an overlap that underscores the importance of thorough clinical assessment when managing thyroid disorders

Conclusion

Thyroid disorders manifest through a broad spectrum of skin, hair, and nail changes. Hypothyroidism was characterized chiefly by dry skin, hair loss, brittle hair, itching, and periorbital puffiness, whereas hyperthyroidism presented mainly with sweating, heat intolerance, and flushing. Awareness of these cutaneous patterns can help clinicians recognize thyroid dysfunction earlier and support more thorough patient evaluation.

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Conflicts of Interest

No evident professional, personal, or financial conflicts of interest to declare.

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