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Original Research Article

Thyroid related skin manifestation and their association with autoimmune dermatology

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ABSTRACT

Background: Thyroid disease is associated with changes in hair, skin and nails. which may sometimes be the first clinical clue. A variety of cutaneous findings may present in the setting of either a hyperthyroid or hypothyroid state. Of all the endocrinopathies that might have cutaneous display of dysfunction, thyroid disorders are presumably the most common. Skin conditions and thyroid autoimmunity are strongly linked, according to convincing evidences alopecia areata and vitiligo have the high incidence. The present study is aimed to study various cutaneous manifestations in thyroid disorders and to know various autoimmune and non-autoimmune dermatologic associations of thyroid disorders.
Methods: This was a Cross-sectional, observational study with sample size of 400 conducted over a period of 18 months starting from August 2022 to February 2024 in S. N. Medical college, Agra, Uttar Pradesh. All patients with thyroid abnormality and cutaneous manifestations are included in the study.
Results: Female preponderance s hypothyroidism hold the major section of thyroid disorders. The most affected age group was 31-40 years. dry skin (67.83%), TE (65.7%) were the commonest symptoms among hypothyroid patients and Warm skin (93.3%) and increased sweating were commonest among hyperthyroid patients. Urticaria (33%) was the most common autoimmune association noted followed by vitiligo (11.75%) and alopecia areata (6.25%) among both hypo and hyperthyroidism patients.
Conclusions: This study shows that various cutaneous manifestations be seen in thyroid patients and significant association with autoimmune dermatological disease.

Keywords: Hypothyroidism, Hyperthyroidism, Skin disease, Thyroid autoimmunity, Urticaria

INTRODUCTION

Thyroid disease have high prevalence in community and encountered in medical practice. Thyroid disorders are known to involve almost all organ systems of the body and the largest organ skin is no exception. Cutaneous manifestation generally appears after the development of thyroid disease; however, it may be the first presenting sign or even precedes the diagnosis by many months and years.[1] The cutaneous manifestation of thyroid disorders has varied presentation and important to the dermatologist. Both abnormal low and high serum levels thyroid hormone can alter the physiological function and normal appearance of human skin and its appendages, prevalence of cutaneous manifestation in thyroid dysfunction ranges from 39-100%.[2]

Thyroid hormone plays a very important role in the embryogenesis and development of skin, as well as maintaining normal function in adults Thyroid hormone have shown to be essential for induction and maintain of normal hair growth and secretion of sebum.[3,4] Due to

insidious nature of hypothyroidism, patients don not seek help until the very last stage of disease. Cutaneous manifestation may be the only clue in case of subclinical hypothyroidism.

Skin symptoms of thyroid dysfunction may be separated into two primary categories: (I) direct action of thyroid hormone on skin tissues, and (II) autoimmune skin disease associated with thyroid dysfunction of autoimmune origin.

In hilly areas iodine deficiency is the leading cause of hypothyroidism. Whom thyroid dysfunction of autoimmune etiology shows association with other autoimmune disease.

Thus, skin not only aids in the diagnosis of thyroid disease but also help in medical practice to select the high-risk patient in whom thyroid abnormality may later develop.

Objectives

The present study is aimed to study various cutaneous manifestations in thyroid disorders and to know various autoimmune and non-autoimmune dermatologic associations of thyroid disorders.

METHODS

This is a cross-sectional observational study conducted over a period of 18 months in Department of DVL in a tertiary hospital. All patients with thyroid abnormality with cutaneous manifestations, either presenting to dermatology OPD or referred from other Departments are included in the study after taking an informed consent.

Total of 400 number of both sex under age of 70 years August 2022 to February 2024 in S. N. Medical college, Agra, Uttar Pradesh was selected after they fulfilled all the inclusion and exclusion criteria.

Demographic data of the patients and detailed history was recorded. A complete clinical examination was carried out and findings were noted.

The tests were also done complete heamogram to rule out pernicious anemia. Liver function tests: including Serum bilirubin to differentiate carotenemias from icterus. Renal function tests: Blood urea, Serum creatinine, blood sugar levels, fasting lipid profile. Thyroid profile: T3, T4, TSH.

All these investigations were done to find any associations with hypothyroidism and also to rule out co-existing systemic diseases that can present with skin changes which can mimic the skin changes of hypothyroidism. Skin biopsy: punch biopsy was done in the cases such as systemic scleroderma, lichen planus, psoriasis, etc to confirm by histological changes.

Statistical analysis

Statistical analysis using SPSS 20 was performed to analyze various dermatological manifestations associated with thyroid disorders and other dermatoses, yielding meaningful conclusions.

RESULTS

The present study comprised of 400 patients in total with laboratory proven thyroid abnormality who presented to DVL OPD with cutaneous manifestation.

Thyroid status

Of these 400 patients 370 (92.5%) were hypothyroid and 30 (7.5%) were hyperthyroid. Out of 370 patients with hypothyroidism, 82 patients (22.16%) were subclinical in thyroid hormone serum values.

Sex distribution

Of the 400 patients included in the study, 337 (84.66%) were females and 63 (15.75%) were males. Female preponderance was seen in both groups of thyroid disorders.

Age distribution

In our study in both the groups of thyroid dysfunction most affected patients were between the age group 31-40 years holding the major portion 116 (29%) followed by age group 21-30 years consist 97 patients (24.25%). (Table 1) showing distribution of age groups in both group in detail.

Cutaneous symptoms in hypothyroid patients

Xerosis was most common skin changes seen in a total 251 (67.83%) followed by thinning of skin 159 (42.97%), myxedema and carotenemia were seen 18 (4.8 %) and 8 (2.16%) respectively.

Melasma was seen most common cutaneous association present in 70 (18.91%) of patient, followed by puffiness of the face and body 46 (12.43%), xanthelasma was also noticed in a significant number of patients 24 (6.48%). (Figure 1) shows all the other skin presentation reported in hypothyroid patients.

Cutaneous symptoms in hyperthyroid patients

In our study warm skin which was most common skin manifestation seen in 28 (93.3%) followed by soft smooth skin 26 (86.6%). Increased pigmentation noticed in 23 (76.66%) number of patients (Figure 2).

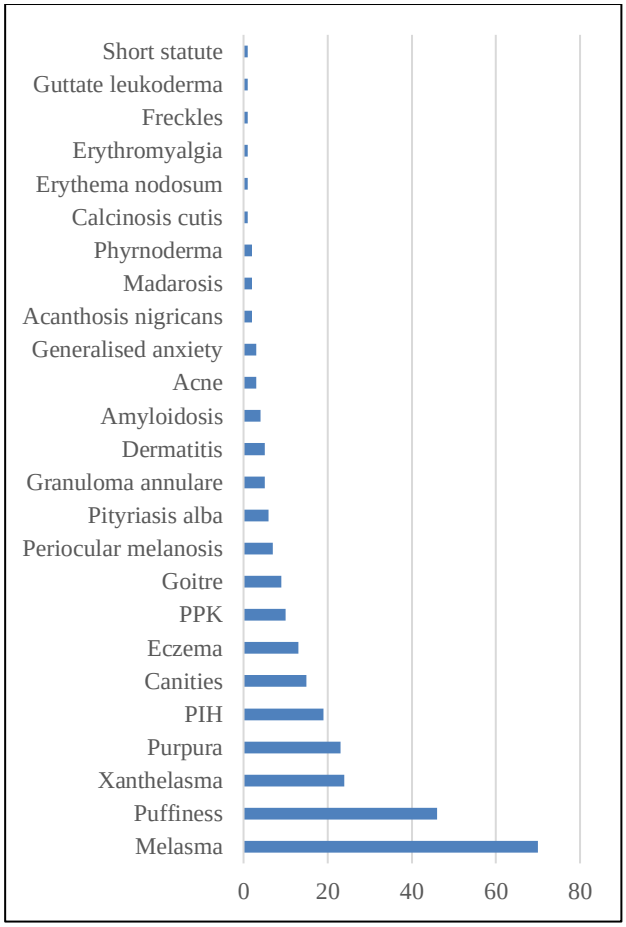

Figure 1: Distribution of cases according to other associated disorders in cases with hypothyroidism.

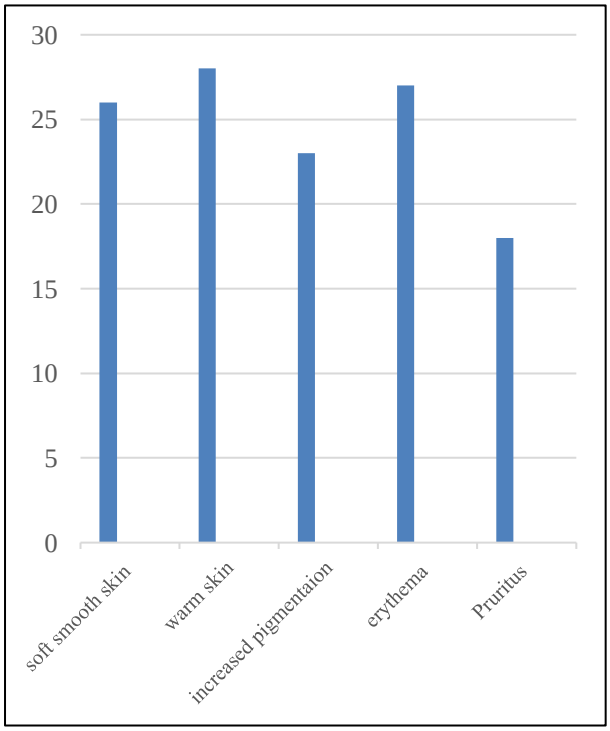

Figure 2: Distribution of cases according to skin changes in hyperthyroidism.

Figure 3: Madarosis in hypothyroidism.

Figure 4: Diffuse hair loss in hypothyroidism.

Figure 5: Child with alopecia areata in hyperthyroidism.

Figure 6: GA in hypothyroidism.

Orbitopathy had been seen in significant number of patients 4 (13.33%) of hyperthyroidism in our study. whereas melasma seen in 3 (10%) followed by myxedema, eczema and xanthelasma 2 (6.66%).

Hair and nail changes in thyroid disorders

In our study telogen effluvium was seen 243 (65.67%) in hypothyroidism patients, followed by dry brittle hair seen in 199 (53.78%). Whereas fine hair was the most encountered problem seen in 26 (86.66%) of hyperthyroidism patients. Nail changes seen in 121 (32.7%) in hypothyroidism patients in form of slow nail growth, yellow nail, Plummer nails, brittle nails. In hyperthyroidism patients 18 (60%) showed thin nail plate, distal onycholysis.

Sweating changes in thyroid disorders

In our study decreased sweating seen in 231 (62.43%) hypothyroidism patients. whereas 26 (86.6%) of hyperthyroidism patients had increased sweating.

Table 1: Distribution of cases according to age of the patient (n=400).

Age of the patient (years)	Hypothyroidism (%)	Hyperthyroidism (%)	All cases (%)	P value
10 or below	13 (3.51)	1 (3.33)	14 (3.5)	
11-20	15 (4.05)	1 (3.33)	16 (4)	
21-30	91 (24.59)	6 (20)	97 (24.25)	
31-40	109 (29.45)	7 (23.33)	116 (29)	
41-50	59 (15.94)	5 (16.66)	64 (16)	0.905
51-60	45 (12.16)	5 (16.66)	50 (12.5)	
61-70	38 (10.27)	5 (16.66)	43 (10.75)	
Mean age (SD)	38.90 (15.09)	42.27 (17.27)	39.15 (15.26)	

Table 2: Distribution of cases according to associated autoimmune diseases (n=400).

Associated autoimmune diseases	Hypothyroidism (%)	Hyperthyroidism (%)	All cases (%)	P value
Urticaria	128 (34.59)	4 (13.33)	132 (33)	0.017
Vitiligo	43 (11.62)	4 (13.33)	47 (11.75)	0.779
SLE, DLE	6 (1.62)	1 (3.33)	7 (1.75)	0.492
Alopecia areata	23 (6.21)	2 (6.66)	25 (6.25)	0.922
Psoriasis	19 (5.13)	2 (6.66)	21 (5.25)	0.718
Lichen planus	16 (4.32)	1 (3.33)	17 (4.25)	0.796
Dermatitis herpetiformis	5 (1.35)	2 (6.66)	7 (1.75)	0.033
Atopic dermatitis	5 (1.35)	0 (0)	5 (1.25)	0.522
Pemphigus disorder	11 (2.97)	0 (0)	11 (2.75)	0.338
Rheumatoid arthritis	7 (1.89)	0 (0)	7 (1.75)	0.447
Morphea	3 (0.81)	0 (0)	3 (0.75)	0.621
None	123 (33.24)	13 (43.33)	136 (34)	0.262

Autoimmune association with thyroid dysfunction

In both the groups urticaria was seen in the greatest number of patients 132 (33%) followed by vitiligo 47 (11.75%) and alopecia areata 25 (6.25%) whereas 136 (34%) patients didn't show any autoimmune association out of 400 cases. But it was noticed in our study that many patients had more than 1 autoimmune condition. Table 2 shows details of autoimmune disease reported in our study in both groups.

Thyroid specific autoantibodies in thyroid disorders

In our study thyroid specific antibodies (anti TPO /anti thyroglobulin) were seen in 37 (10%) of hypothyroid patients. In hyperthyroid patients 2 (6.66%) showed autoantibody presence.

Family history

Family history of thyroid dysfunction was significantly seen in 91 (22.75%) out of 400 patients. 88 (23.78%) patients had in hypothyroidism group and 3 (10%) in hyperthyroidism group.

DISCUSSION

In our study, we observed a notably higher prevalence of thyroid diseases among females. Out of a total of 400 patients, 337 were female, constituting 84.25% of the study population. This finding underscores a significant gender disparity in the occurrence of thyroid disorders within our sample. A similar proportion was seen in a study done by Ersoy Acer et al, (2019), whereas Frederick et al, (2016) showed 87 % of female patients in their study.[7] In our study, the average age at which individuals typically present was 39.5 years, which aligns closely with the findings reported by Frederick et al, (2016)[4]

In the present study, 92.5% of patients had hypothyroidism rest 7.5 % had hyperthyroidism. Sindhu et al, (2016) reported a similar incidence of 90 % of hypothyroidism But B. Srujana1 et al, (2014) in their study had 77 % of hypothyroidism that is a smaller number of patients reported hypothyroidism group. In our study 22.7% had positive family history of thyroid disorders and associated autoimmune disease in thyroid patients was 66%, which is less than what studies by Srujana et al 41% and 79% respectively.

Hypothyroidism

Among the 370 hypothyroid patients in our study, a significant majority, 84.05%, were females. B. Srujana et al, (2014) noted 83% female and 9.57% male patients in their study, while Indra et al 75 reported 87% females in theirs. In summary, our findings underscore the predominance of hypothyroidism among females, largely due to autoimmune factors, and highlight the critical

In our study, dry, xerotic skin is the most common cutaneous manifestation found in patients with hypothyroidism, affecting approximately 67.83% of individuals. This prevalence is significantly higher compared to the findings of Brănișteanu et al and Dogra et al who reported xerosis in only 45.8% and 56% of their patients, respectively.[6,8] However, a study conducted by Puri N observed an even higher prevalence, with 100% of patients exhibiting dry, xerotic skin. Hypohidrosis accompanied by cytologic changes within the eccrine apparatus and diminished sebaceous gland secretion have been considered as potential etiologic factors. Keratoderma was observed in 2.7% of the patients in our study, which is lower compared to previous findings by Sindhu et al, (2016) 18.5%. Our study shows a slightly higher incidence of both cold intolerances and reduced sweating i.e., 78.1% and 62.43 %. In our study, 65.67% of patients were found to have diffuse hair loss, which is higher than the 43.2% reported by Sindhu et al, (2016) and the 51% reported by Srujana et al (2014).

In our study, 32.7% of patients had nail changes most common were brittle nails followed by onycholysis and pincer nails. A similar incidence was reported by Puri Neerja in her study i.e., 38.9 %.

In our research, we found that among patients diagnosed with hypothyroidism, vitiligo was noted in 11.62% of cases, while urticaria was observed in 34.59%. The connection between hypothyroidism and vitiligo is widely acknowledged in medical literature as shown in Jayanthi Bhavya Sindhu et al, (2016) had 8.64% of patients with vitiligo and 14.8 % of patients with urticaria most of them were chronic spontaneous urticaria. We came across a higher incidence of urticaria and vitiligo in our study as compared to other studies. According to Heymann, there has been a recognized correlation between urticaria and autoimmunity, particularly concerning the aggregation of thyroid anti-microsomal antibodies in ASST positive urticaria patients. However, our research did not uncover evidence supporting this connection. Alopecia areata in our study were reported in 6.21 % patients of, which is higher than reports by Puri Neerja9 i.e., 4%.

Several other autoimmune diseases which had been reported in our study in small proportion are LP (4.32%), psoriasis (5.13%), SLE, DLE (1.62%), DH (1.35%), atopic dermatitis (1.35%), RA (1.89%), morphea and scleroderma (0.81%). Pemphigus group of disorders (2.9%). Jayanthi Bhavya Sindhu et al, (2016 and Frederick et al, (2016) reported less similar distribution of these disorders in patients of hypothyroidism.

Hyperthyroidism

Out of 30 patients, 26 patients were females in our study. In our study, the predominant cutaneous features observed in patients included warm skin (93.3%), smooth and soft skin (86.6%), hyperhidrosis (86.6%), and pruritus (18%). Hair changes were present in 86.66% of the patients, and nail changes were noted in 60%. These findings are significantly higher compared to the study conducted by Puri Neerja, where 71.4% of patients with hyperthyroidism, and diffuse non-scarring alopecia were noted, while 28.6% of these patients also exhibited onycholysis. In our study heat intolerance and hyperhidrosis were seen in (86.6%) which is more as compared to puri neerja (64.5%).

Four patients exhibited proptosis, and among them, one had elevated TSH-R autoantibodies. The ocular manifestations observed in our patients corresponded to those documented by Carlesimo et al.[10] Among the observed diseases, the most frequently encountered conditions included urticaria, alopecia areata, melasma, and vitiligo. Notably, all three individuals diagnosed with

vitiligo were found positive for thyroid autoantibodies, underscoring a significant link between vitiligo and autoimmune thyroid disorders. This finding is consistent with studies by Betterle et al, (1988) and Alkhateeb et al, (1989) which also identified a significant link between thyroid autoimmunity and vitiligo.[11,12] Alopecia was observed in two of our subjects, one of whom had elevated thyroid antibodies. This supports the findings of Bakry et al, who reported a connection between hyperthyroidism and alopecia.[13] Additionally, chronic urticaria was present in 13.7% (4) of the patients, aligning with the results of Artantas et al who documented an increase in urticaria cases.[14]

Study included thyroid patients with cutaneous manifestations potentially excluding asymptomatic patients. Patients above 70 years of age or with specific systemic disease were excluded, potentially impacting the results of the study.

CONCLUSION

Our research suggests that the relationship between the thyroid gland and skin is intricate and dynamic. both hyperthyroidism and hypothyroidism are associated with broad range of cutaneous symptoms. Female preponderance is seen. Our study also noted positive correlation between thyroid disorders and other autoimmune disorders.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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