Original Article

Cutaneous Manifestations of Hypothyroidism: Prospective Hospital Based Clinical Study

Aditi Jamwal, Vipin Gupta[1], Anil Sharma[2], Parvaiz A Rather[3]

Consultant Dermatologist, Mandi, Himachal Pradesh, [1]Professor & Head, Department of Dermatology, STD & Leprosy, Government Medical College, Jammu, India, [2]Department of Medicine, Government Medical College, Jammu, India, [3]Senior Resident Dermatology, Government Medical College, Srinagar Kashmir.

Corresponding Author:
Dr. Parvaiz Anwar Rather
Department of Dermatology,
Government Medical College,
Srinagar-190010
Jammu & Kashmir, India.
Phone number: 09419129334.
E-mail: parvaizanwar@gmail.com

Received: 12-09-2013

Revised: 15-10-2013

Accepted: 23-10-2013

Abstract:
Background: Normal functioning thyroid gland is important for healthy skin and there is a complex relationship between the two. Various studies have revealed multitude of cutaneous changes (in skin, hair and nails) that occur in thyroid hormonal dysfunction, in both hyper and hypo thyroid states. More studies are required to ascertain this relation.
Aim: To study skin, hair and nail changes in hypothyroidism.
Methods: All diagnosed cases of hypothyroidism, of any age and sex, both old and fresh, who attended Endocrinology Department of a tertiary care level hospital over one year period, were consecutively assessed for cutaneous changes by detailed history, clinical examination and histopathological confirmation.
Results: There were 100 patients of hypothyroidism, 94 females and 6 males, with mean age of 37.8 (±12.57) years. The most common cutaneous symptoms were dry skin (65%), followed by hair loss (48%), puffy oedema of face, hands and feet (37%), pruritus (18%), decreased sweating (11%), delayed wound healing (11%), yellow discoloration of skin (9%) and urticaria (4%). The most common cutaneous signs were xerosis (67%), followed by altered skin texture (47%), hyper-pigmentation (46%), keratoderma (28%), carotenemia (8%) and periungual telangiectasia (2%). The commonest nail changes were brittle nails (7%) followed by loss of cuticle (4%). The most common hair findings were diffuse loss of hair, seen in 52% of patients, followed by coarse scalp hair (35%), both diffuse hair loss along with coarse scalp hair (25%).
Conclusion: Hypothyroidism may present as or be associated with many changes in skin, hair and nails. Keeping this in mind, a dermatologist can provide a vital link for early evaluation and detection of hypothyroidism for its curative treatment.
Key words: Cutaneous changes, Hypothyroidism, Thyroid gland.

This article may be cited as: Jamwal A, Sharma A, Rather PA. Cutaneous Manifestations of Hypothyroidism: Prospective Hospital Based Clinical Study. J Adv Med Dent Scie 2013;1(2):5-12.

Introduction:

Thyroid hormones are instrumental in regulating the normal condition of skin. Thyroid hormonal dysfunction, whether hyper or hypo active state, can lead to a variety of manifestations in skin, hair and nails. Hypothyroidism may be caused by defects in the thyroid gland itself (primary hypothyroidism) or as a consequence of pituitary or hypothalamic dysfunction (secondary and tertiary hypothyroidism

respectively).[1] Deficiency of thyroid hormone in infants and children leads to cretinism, where the child in addition to physical and mental retardation has dry, coarse skin, with dry, sparse hair.[1] Hypothyroidism increases in incidence and prevalence with age, particularly among the elderly, where its clinical manifestations may be less obvious in the setting of somatic and other age related complaints. It is also more common in the elderly women because of increased autoimmune thyroiditis. Hypothyroidism can be overt or subclinical. The cutaneous changes seen in hypothyroidism are either related to slow metabolism seen in this condition or due to dermal accumulation of muco-polysaccharides which bind water in the tissue, leading to myxedematous appearance.[1] About 25-40% patients show an atypical presentation that prevents the disorder from being diagnosed and treated early. There is widespread thinning, dryness, pallor, cold feel of skin, scaling, fine wrinkling (parchment like skin), icthyosis, localized hyperkeratosis especially of palms and soles (keratoderma), scanty sweating, yellowish hue mostly on hands, feet and face, malar flush,[2,3,4,5] puffiness markedly of hands and periorbital area, impaired wound healing and purpura. The hair commonly becomes dry, thin, brittle, coarse and sparse. Eyebrows frequently disappear with loss usually originating laterally. Nails show, thinning, striations, brittleness, slow growth and onycholysis.[5] Other cutaneous disorders associated with hypothyroidism include chronic mucocutaneous candidiasis,[6] candidial folliculitis,[3] pityriasis rubra pilaris,[7] melasma,[8] eczema craquele.[9] Scleroderma, vitiligo, alopecia areata, pemphigus vulgaris, pemphigus foliaceous and dermatitis herpetiformis are also assoiated.[10]

The present study of cutaneous manifestations of hypothyroidism highlights the importance for a dermatologist to get the underlying thyroid hormonal dysfunction evaluated and corrected, in order that the patient gets curative rather than symptomatic treatment.

Methods:

All consecutive diagnosed cases of hypothyroidism of any age and sex, diagnosed on the basis of clinical assessment and thyroid hormonal profile who attended endocrinology department of our tertiary care level hospital, over a period of one year from November 2007 to October 2008, were included in the study.

Details regarding systemic and cutaneous complaints, family history, history of drug intake and other related history were recorded. General, physical, systemic and dermatological examination of the patients was carried out in adequate day light and relevant details recorded. Skin biopsy and histopathological examination was done in few cases. At the end of the study, data was subjected to statistical analysis.

Results:

This prospective clinical study involved 100 diagnosed patients of hypothyroidism, 6 males and 94 females. The age of patients ranged from 8-67 years, with a mean of 37.8 (±12.57) years. Maximum number of patients were in the age group 31-50 years (53%), with least number in the age group >60 years (1%) as shown in table 1.

Cutaneous symptoms: The most common cutaneous symptoms were dry skin (65%), followed by hair loss (48%), puffy oedema of face, hands and feet (37%), pruritus (18%), decreased sweating (11%), delayed wound healing (11%), yellow discoloration of skin (9%) and urticaria (4%), as summarized in table 2. The number of patients with skin complaints increased with the age of patients. Dry skin, pruritus and hair loss were seen more frequently with older age groups. On the other hand , yellow

Table 1: Distribution of patients as per age groups

Distribution of patients as per Age Groups	
Age groups (years)	No: of patients
<10	2
11-20	7
21-30	22
31-40	23
41-50	30
51-60	15
>60	1
Total	100

discoloration of skin, puffy oedema of face, hands and/or feet and decreased sweating were more common cutaneous complaints with the younger age groups, as summarized in table 2.

Cutaneous signs: The most common cutaneous sign was xerosis (67%), followed by altered skin texture (47%), hyperpigmentation (46%), keratoderma (28%), carotenemia (8%), periungual telangiectasia (2%). Altered skin texture, xerosis , keratoderma and carotenemia were seen more commonly in the older age group 41-60 years. But hyperpigmentation, especially melasma and diffuse pigmentation were seen more frequently in the age group of 21-40 years. The commonest skin finding seen in the youngest age group <20 years was also hyperpigmentation especially diffuse, followed by xerosis and altered skin texture, as shown in table 3 and figures 1 and 2.

Nail signs: The commonest nail changes were brittle nails (7%) (Figure 3A) followed by loss of cuticle (4%), periungual telangiectasia (2%), onycholysis (1%), vertical striations (1%). The nail changes were seen more in the older age group 41-60 years. No patient in the age groups <20 and summarized in table 4. 60 years showed any nail abnormality, as as summarized in table 4.

Hair signs: The most common hair finding was diffuse loss of hair, seen in 52% of patients (figure 3B), followed by coarse scalp hair (35%). diffuse hair loss along with coarse scalp hair (25%), alopecia universalis (1%) (Figure 3C), as shown in table 5. Other associated cutaneous and non-cutaneous diseases are shown in tables 6, 7 & figure 4.

Discussion:

Hypothyroidism is a common endocrine disorder which affects people of both sexes and all ages and may be overt or subclinical[1]. At one extreme are patients who have few symptoms and signs of hypothyroidism and at the other extreme are those with myxedema coma.[11] In addition to various non-cutaneous symptoms and signs of hypothyroidism, presence of cutaneous changes may sometimes be the single most important factor in a patient's decision to seek medical attention.[12] So this prospective clinical study was undertaken to assess the cutaneous manifestations of hypothyroidism. The mean age of patients was 37.8 years, which corresponds with other studies: 39.15 years[13] and 33.5 years.[14] The maximum number of patients were in the age group of 41-50 years (30%), similar to other studies.[15] Though our study clearly showed an increasing trend of hypothyroidism with growing age, similar to other observations;[16] yet only one patient in age group >60 years could be because less number of elderly patients are brought to hospital, and their complaints are thought to be due to senile changes.[17] Females predominated in our study, 94 females and 6 males, with female to male ratio of approximately 15:1, slightly higher than other studies.[14,15] The female preponderance may be due to increased association of autoimmune disorders including autoimmune thyroiditis in females. The most common cutaneous complaints were dry skin (65%), followed by hair loss (48%), puffy oedema of face, hands and feet (37%), pruritus (18%),

Table 2: Cutaneous symptoms in each Age Group

Cutaneous symptoms in each Age Group					
Symptom	<20 yrs*	21-40 yrs	41-60 yrs	>60 yrs	Total #
Dry skin	2 (22.2)	26 (57.7)	35 (77.7)	1 (100)	65
Decrease sweating	3 (33.3)	2 (4.45)	6 (13.34)	0 (0)	11
Yellow skin	3 (33.3)	3 (6.67)	3 (6.67)	0 (0)	9
Puffy oedema	4 (44.4)	14 (31.12)	19 (42.23)	0 (0)	37
Purpura	1 (1.11)	5 (11.12)	1 (2.23)	0 (0)	7
Delayed wound healing	1 (1.11)	6 (13.34)	4 (8.89)	0 (0)	11
Brittle nails	0 (0)	1 (2.23)	1 (2.23)	0 (0)	2
Onycholysis	0 (0)	1 (2.23)	0 (0)	0 (0)	1
Hair loss	4 (4.4)	19 (42.23)	24(53.34)	1 (100)	48
Coarse scalp hair	1 (1.11)	6 (13.34)	4 (8.89)	0 (0)	11
Urticaria	0 (0)	1 (2.23)	3 (6.67)	0 (0)	4
Pruritus	1 (1.11)	6 (13.34)	10 (22.3)	1 (100)	18
***Figures in parenthesis are percentages** **#Some patients had more than one symptom**					

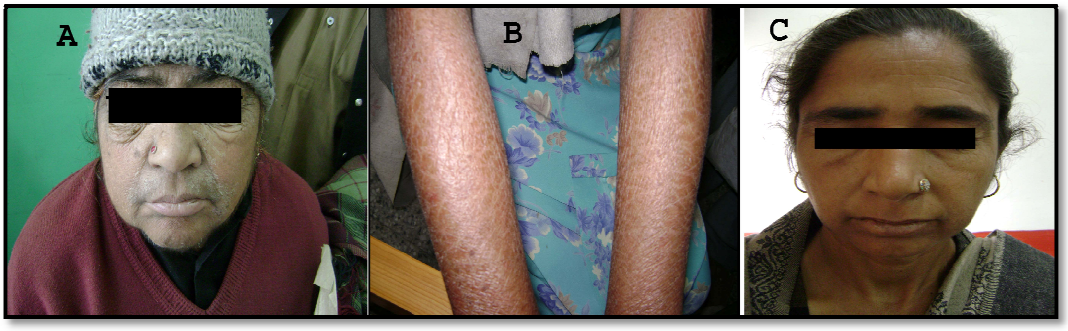

Figure 1: Clinical photograph showing xerosis (A), icthyosis (B), and carotenemia (C).

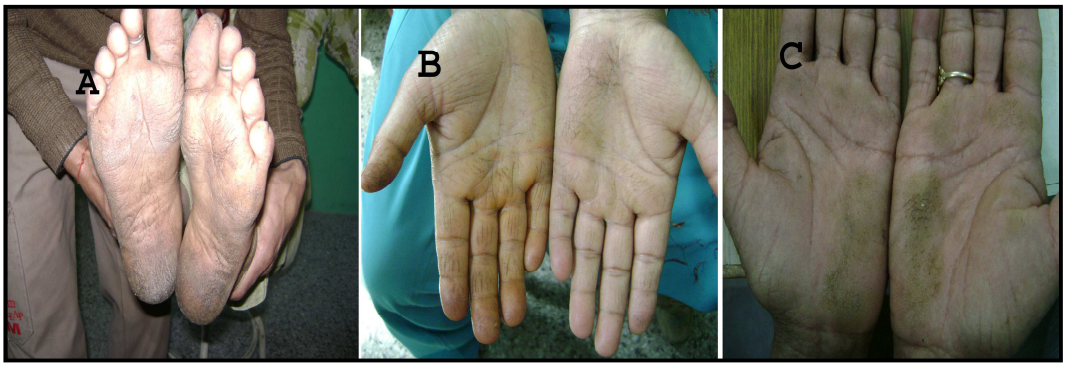

Figure 2: Clinical photograph of keratoderma feet (A) and hands (B, C).

Table 3: Cutaneous signs in each Age Group

Cutaneous signs in each Age Group					
Signs #	<20 yrs*	21-40 yrs	41-60 yrs	>60 yrs	Total
Alteration in skin texture	3 (33.3)	19 (42.2)	24 (53.3)	1 (100)	47
Xerosis	3 (33.3)	28 (62.22)	36 (80)	0 (0)	67
Keratoderma	1 (1.11)	10 (22.22)	17 (37.7)	0 (0)	28
Carotenemia	0 (0)	3 (6.66)	5 (11.11)	0 (0)	8
Hyperpigmentation	4 (4.44)	26 (57.7)	16 (35.5)	0 (0)	46
a)melasma	1 (1.11)	13 (28.8)	3 (6.67)	0 (0)	17
b)diffuse	2 (2.22)	7 (15.55)	4 (8.89)	0 (0)	13
c)periocular	1 (1.11)	6 (13.34)	9 (20)	0 (0)	16
Periungual telangiectasia	0 (0)	1 (2.23)	1 (2.23)	0 (0)	2
***Figures in parenthesis are percentages # Some patients had more than one symptom**					

Table 4: Nail changes in each age group

Nail changes in each Age Group (years)			
Signs #	21-40	41-60	Total
Brittle nails	2 (4.44)	5 (11.11)	7
Onycholysis	1 (2.22)	0 (0)	1
Cuticle lost	2 (4.44)	2 (4.44)	4
Periungual telangiectasia	1 (2.22)	1 (2.22)	2
Vertical striations	0 (0)	1 (2.22)	1
***Figures in parenthesis are percentages #Some patient had more than symptom**			

Table 5: Hair changes in each age group

Hair changes in each Age Group (in years)					
Signs	<20	21-40	41-60	>60	Total
Coarse scalp hair	3 (33.33)	12 (26.6%)	19 (42.2%)	1 (100%)	35
Diffuse hair loss	9 (100%)	22 (48.8%)	24 (53.3%)	1 (100%)	52
Both coarse scalp hair & hair loss	2 (22.22%)	9 (20%)	13 (28.8%)	1 (100%)	25
Alopecia universalis	0 (0%)	1 (2.22%)	0 (0%)	0 (0%)	1
***Figures in parenthesis are percentages**					

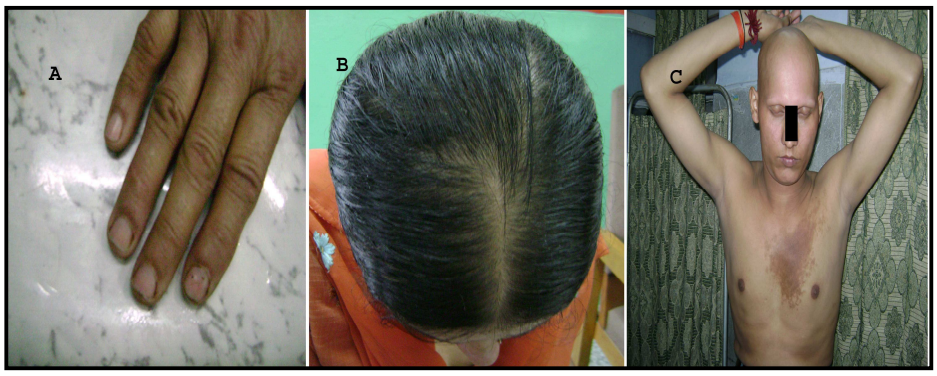

Figure 3: Clinical photograph showing brittle nails (A), diffuse hair loss (B), and alopecia universalis (C).

decreased sweating (11%), delayed wound healing (11%), yellow discoloration of skin (9%) and urticaria (4%), observations similar to other studies.[4,5,11,14,18,19] Dryness of skin is due to diminished eccrine and sebaceous gland activity and also because of decreased sweating due to cytological changes in the sweat glands in hypothyroidism.[2] Hypothyroidism causes increase in number of telogen hair, explaining increased hair loss.[20] Facial puffiness and non-pitting oedema of hands and feet is related to tissue infiltration with muco-polysaccharides predominantly in the papillary dermis around the vessels and appendages, and also increase in tissue sodium concentration with associated water retention.[12] Pruritus can be explained by decreased activity of sweat glands, sebaceous glands and low epidermal sterol synthesis.[21] Yellowish discoloration is caused by elevated serum and tissue carotene concentration due to block in the metabolic pathway from carotene to vitamin A. Urticaria can be explained on the basis of autoimmunity.[22]

Pallor of the skin was seen in 50% patients, similar to other studies.[11,16] This complexion is described as 'strawberry and cream' because general pallor is associated with erythema of cheeks. It develops as a normal response to decreased oxygen requirement and results in decrease in erythropoietin and erythropoiesis with a slight bone marrow hypoplasia.[16] Another reason for pallor is cutaneous vasoconstriction[11] and anaemia.[12]

The most common cutaneous sign was xerosis (67%), followed by altered skin texture (47%), hyperpigmentation (46%), keratoderma (28%), carotenemia (8%), periungual telangiectasia (2%). These findings are similar to other studies.[13] The number of patients with dry coarse skin was higher (67%), as compared to 16% in one study[14] and lower as compared to 90% in the other[23], but similar to other studies.[11,18,19]

Dry, rough, cool, scaly skin can be explained by decreased cutaneous metabolism, reduced secretion of sweat and sebaceous glands, vasoconstriction, thinning of epidermis and hyperkeratosis of stratum corneum.[11] The thinning of epidermis is of pituitary origin. Carotenemia is due to reduced conversion of β-carotene to vitamin A in liver and increased blood levels of carotene lead to accumulation of carotene in stratum corneum.[4] The hyperpigmentation may be due to increased release of pituitary adrenocorticotropic hormone, compensating for the cortical insufficiency, secondary to severe long standing hypothyroidism.[24,25] Periungual telangiectasia is due to thinning of the epidermis and disturbed microvascular auto-regulatory mechanism in hypothyroid patients.[26]

The commonest nail changes were brittle nails (7%) followed by loss of cuticle (4%), periungual telangiectasia (2%), onycholysis (1%), and longitudinal striations (1%); similar to other studies.[5,11,13,23] The nail changes were seen more in the older age group 41-60 yrs, which can be attributed to decreased function of the nail matrix.

The most common hair finding was diffuse loss of hair, seen in 52% patients, similar with other studies[3,12,13,16], and higher compared to 9% in another study.[14] Hair loss can be attributed to inhibition of initiation and duration of the actively growing phase of hair cycle. Hence the percentage of hair in telogen increases leading to telogen effluvium. Since the duration of anagen is also affected, the hair growth is slowed with decreased length.[20] Coarse scalp hair was found in 35 patients (35%), similar to other studies[3,11] and less as compared to 76% in one study. The reason for coarse, dry and brittle hair in our patients is due to diminished sebum secretion.[9] A single male patient in the age group of 21-40 yrs had alopecia universalis. Association of alopecia totalis and alopecia areata with

hypothyroidism has been reported.[3,4,12,13,25,26] This is due to autoimmunity associated with thyroid disorders, especially Hashimoto's thyroiditis. Other associated cutaneous signs were allergic dermatitis in 2 patients, as dry skin of hypothyroidism is more predisposed to both allergic and irritant dermatitis. Hypertrichosis was seen in 3 patients, similar to other studies.[12] Xanthelasma was seen in 3 patients, similar to other studies.[13] Biosynthesis of fatty acids and lipolysis is reduced. The changes in fat metabolism result in an increase in plasma lipid concentrations in hypothyroid patients. This increase in plasma cholesterol is largely accounted for by an increase in low density lipoprotein (LDL) cholesterol.[16]

2 patients had discoid lupus erythematosus as an associated disease and 1 patient had polymorphic light eruption, as also reported in other studies.[28,29] It is postulated that the link between thyroid disease and LE is based on a common genetic predisposition and abnormal T cell function.[3] Seborrhoeic keratosis was seen in 2 patients. We found 1 patient each of psoriasis, oral LP, acanthosis nigricans, vulval candidiasis. 2 patients had knuckle pads and 1 patient showed ecchymosis, associations reported in other studies also.[3,6,30,31,32] Bruising may be explained due to altered dermal support to capillaries.[12]

Conclusion

Various symptoms and signs related to skin, hair and nails, such as altered skin texture, xerosis, keratoderma, non-pitting edema, hyper-pigmentation, diffuse hair loss, coarse hair and brittle nails, go undiagnosed and many a times are not evaluated properly. In our study, hypothyroidism was closely associated with such cutaneous changes. It is thus recommended to evaluate for various cutaneous symptoms and signs associated with hypothyroidism for its early detection and treatment.

References

1. Heymann WR. Advances in the cutaneous manifestations of thyroid disease. Int J Dermatol 1997; 36: 641-5.
2. Means MA, Dobson RL. Cytological changes in the sweat gland in hypothyroidism. J Am Med Assoc 1963; 186: 113-5.
3. Heymann WR, Marlton MD. Cutaneous manifestations of thyroid disease. J Am Acad Dermatol 1992; 26: 885-99.
4. Jabbour SA, Miller JL. Endocrinopathies and the skin. Int J Dermatol 2000; 39: 88-99.
5. Ai J, Leonhardt JM, Heymann WR. Autoimmune thyroid disease: etiology, pathogenesis and dermatologic manifestations. J Am Acad Dermatol 2003; 48: 641-59.
6. Coleman R, Hay RJ. Chronic mucocutaneous candidosis associated with hypothyroidism:a distinct syndrome. British J Dermatol 1997: 136: 24-29.
7. Orlandini V, O. Cogrel M S Doutre, C Beylot, M Beylot-Barry. Pityriasis rubra pilaris and hypothyroidism: Efficacy of thyroid hormone replacement therapy in skin recovery. British J Dermatol 2007; 156: 575-612.
8. Lufti RJ, Fridmanis M, Misiunas AL, Pafume O, Gonzalez EA, Villemur JA, et al. Association of melasma with thyroid autoimmunity and other thyroidal abnormalities and their relationship to the origin of melasma. J Clin Endocrinol Metabol 1985;61:28-31.
9. Warin AP. Eczema craquele as the presenting feature of myxoedema. British J Dermatol 1973; 89; 289-91.
10. Burman KD, McKinley-Grant L. Dermatologic aspects of thyroid disease. Clinics in Dermatol 2006; 24: 247-55.
11. Tonacchera M, Chiovato L, Pinchera A. Clinical assessment and systemic manifestations of hypothyroidism.

Oxford Textbook of Endocrinology and Diabetes 1st edition, 2002:491-501.
12. Bernhard JD, Freedberg IM, Vogel LN. The Skin in Hypothyroid. Werner and Ingbar's The Thyroid 7th ed 1996; 792-5.
13. Dogra A, Dua A, Singh P. Thyroid and skin. Indian J Dermatol 2006; 51: 96-99.
14. Khurram IM, Choudhary KS, Khan M, Islam N. Clinical presentation of hypothyroidism: a case control analysis. Journal of Ayub Medical College Abottabad 2003; 15: 1-6.
15. Indra R, Patil SS, Joshi R, Pai M, Kalantri SP. Accuracy of physical examination in the diagnosis of hypothyroidism;a crossectional; double blind study. J Postgraduate Med 2004: 50: 7.
16. Wiersinga WM. Hypothyroidism and myxedema coma. Endocrinology 5th edition, 1999: 2081-2086.
17. Hurley DL, Garib H. Detection and Treatment of Hypothyroidism and Grave's disease. Geriatrics 1995: 50: 41-44.
18. Leonhardt JM, Heymann WR. manifestation of other endocrine disease. Fitzpatrick's Dermatology in General Medicine 6th edition, 2003:1664-1665.
19. Graham RM, Cox NH. Systemic Diseases and the Skin. Rook's Textbook of Dermatology 7th edition, 2004:59.8-59.9.
20. Frienkel RK, Freinkel N. Hair growth
23. Rai D, Wahid Z, Zaidi AN. Cutaneous manifestations of thyroid disease. J Pak Assoc Dermatol 2000; 10: 8-11.
24. Larsen PR, Davies TF. Hypothyroidism and Thyroiditis. William's Textbook of Endocrinology 9th edition, 1998: 423-455.
25. Niepomniszcze H, Amad RH. Skin disorders and thyroid diseases. J Endocrinol Invest 2001: 24: 628-38.
26. Pazos-Moura CC, Moura EG, Breitenbach MMD, Bouskela E. Nailfold Capillaroscopy in Hypothyroidism and Hyperthyroidism: Blood Flow Velocity During Rest and Postocclusive Reactive Hyperemia. Angiology 1998: 49: 471-4.
27. Cowan CL, Grimes PE, Chakabarti S. Retinitis Pigmentosa associated with hearing loss, thyroid disease, vitiligo and alopecia areata. Retina 1982; 2: 84-8.
28. Dhir R, Ahluwalia AI, Sridhar J, Mani H, Pruthi HS, Shah KM. Autoimmune thyroiditis predating the presentation of systemic lupus erythematosus: two cases and a review of literature. Indian J Dermatol Venerol Leprol 2002; 68: 292-4.
29. Van Der Meer Roosen CH, Maes EPJ, Faber WR. Cutaneous lupus erythematosus and autoimmune thyroiditis. British J Dermatol 1979; 101: 91-2.
30. Acharya S, Srinivas CR, Balachandran C. Psoriasis with myxedema responding

Source of Support:
Nil Conflict of Interest: None declared

31. Dix JH, Levy WJ, Fuenning C. Remission of acanthosis nigricans, hypertrichosis, and Hashimoto's thyroiditis with thyroxine replacement. Paediatric Dermatology 1986: 3: 323-6.
32. Matsuoka LY, Wortsman J, Gavin GR III. Acanthosis nigricans, hypothyroidism, and insulin resistance. Am J Med 1986: 81: 58-62.


J
A
M
D
S
R