

Case Report

Investigation of Diffuse Hair Fall Case Due to Vitamin D Deficiency: A Case Report and Literature Review

H. H. Suad¹ and Gad Allah Modawe²

¹Omdurman Islamic university, Faculty of Medicine and Health Sciences, Department of Dermatology

²Omdurman Islamic university, Faculty of Medicine and Health Sciences, Department of Biochemistry

Abstract

A 45-year-old female from northern Sudan presented a complaint of diffuse hair loss from her scalp for 4 years. The condition started when she was in Saudi Arabia, where she resided for five years with her husband and children. The condition is associated with fatigability and easily falling asleep. The condition is static with no known relieving or aggravating factors. She looks well, not pale, jaundiced or cyanosed, regular pulse, no lymph node enlargement; thyroid is central with normal size and no lower limb edema. Scalp: looks normal, no scales or erosions. Hair: hair is dry with normal texture; loss is diffuse, no apparent patch of alopecia. Axillary and pubic hair is normal. All investigations were within normal values except serum vitamin D that was found to be very low: 9 (average value 30–300). Management plans to correct the deficiency for three months, and then a daily maintenance dose is to be prescribed. The monitoring of vitamin D serum level is to be assessed to avoid hyper vitaminosis. Vitamin D supplement was prescribed as oral tabs of 50,000 IU weekly for three months. Daily maintenance dose of 1000 IU was prescribed. Improvement was noticed starting from the first month, and excellent result was achieved after three months of daily supplementation; daily maintenance dose was then prescribed with an advice of being outdoors to enhance endogenous synthesis. **Conclusion:** Serum vitamin D level should be assessed in patients with hair loss, especially those at a risk because of being indoors.

Keywords: vitamin D, diffuse hair loss, scalps

Corresponding Author: H. H. Suad; email: Dr.suadhassan4@gmail.com

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1. Introduction

Vitamin D refers to a group of fat-soluble secosteroids that are very important to the body because they increase intestinal absorption of calcium magnesium and phosphate, they also have other biologic effects. VitaminD₃ and vitamin D₂ are considered the most important compounds in this group [1]. They can be taken in diet [2]. Vitamin D is synthesized in the skin from cholesterol through a chemical reaction that is dependent on sun exposure (specially UVB). It undergoes enzymatic conversion by hydroxylation in the liver and kidney to change to the active form. They are considered as hormones rather than vitamins [3]. Cholecalciferol is converted in the liver to 25hydroxycholecalciferol, ergocalciferol is hydroxylated in position 25 to form the active metabolite 25 hydroxyergocalciferol, serum level of these two metabolites are measured to assess vitamin D status of the individual [4, 5]. Calcifediol is further hydroxylated by the kidneys to form 1,25-dihydroxycholecalciferol, the biologically active form of vitamin D [6]. It circulates as a hormone in the blood, having a major role in regulating the level of calcium and phosphate, they also act in enhancing the promotion of healthy growth and bone remodeling. Calcitriol also acts as immune modulator and anti-inflammatory [7].

Diffuse hair loss in women can be caused by many factors, the most common cause is female pattern hair loss (FPHL) [8]. Diffuse hair loss occurs due to changes in hair follicle cycling [9]. An androgen-dependent nature has not been proven in FPHL. Most women with FPHL do not have biochemical hyperandrogenism [1]. Women without circulating androgens may also develop FPHL [10], suggesting a possible role for non-androgen-dependent mechanisms. This could explain why some women with FPHL do not respond to androgen inhibition therapy [11]. The found normal serum level of vitamin D is needed to delay cellular-aging process in the body including hair, this fact explains hair loss when there is vitamin D deficiency [12], and serum vitamin D level should be assessed in women suffering from hair loss [13].

Rasheed et al. found that low serum vitamin D and serum ferritin are lower in patients with FPHL and also diffuse hair loss in patients aging 18–45 years; they suggested that serum levels of vitamin D and ferritin should be assessed, concluding that their correction may be beneficial when they are low [14].

Cerman et al. screened 86 patients with a specific type of hair loss, alopecia areata, in a cross-sectional study and found that vitamin D is significantly lower in patients with alopecia areata than the control. They suggested screening all patients with alopecia

areata for vitamin D deficiency and thought that supplementation of such patients with vitamin D can be of value [15].

An endocrine society for clinical practice stated that vitamin D deficiency is common among all age groups, and that few foods contain vitamin D, and the main source for vitamin D is the synthesis in the skin by the ultraviolet light; so people at risk should be screened for its deficiency because it is associated with many health problems. The society had established guidelines for the prevention and treatment of the deficiency of vitamin D and also recommended the supplementation with vitamin D for prevention and treatment of the deficiency [16].

2. Case Report

A 45-year-old female from northern Sudan presented a complaint of diffuse hair loss from her scalp for 4 years. The condition began when she was in Saudi Arabia, where she resided with her husband and children for five years. The condition is associated with fatigability and easily falling asleep. The condition is static with no known relieving or aggravating factors. Systemic review revealed no abnormality, no palpitation, hyper- or hypohidrosis, but she feels depressed, is a newly discovered diabetic, and hypertensiveness is unknown. She has a past history of hospital admission as a child for tonsillectomy and adenoidectomy, but no history of blood transfusion. She's has no regular medications apart from Metformin 500 mg, which was prescribed by her doctor for the control of mild diabetes mellitus. She has a family history of diabetes mellitus and asthma, but no history of diffuses hair loss. The patient is a house wife married for 20 years, has two daughters and two sons: the eldest is 19 years old and the youngest is 7 years old. They live in their own house—a two-floor building with a big courtyard in Khartoum north—but very rarely stay outside. Being a house wife she has been staying indoors and rarely goes outdoors during the day, but when she does, she puts on a sunscreen with SPF 50+. She has regular period, with average loss.

On examination, she looks well, not pale, jaundiced or cyanosed, regular pulse, no lymph node enlargement, thyroid is central with normal size and no lower limb edema. Scalp: looks normal. Hair: hair is dry with normal texture, loss is diffuse, no apparent patch of alopecia. No scales or erosions. Axillary and pubic hair are normal.

3. Investigations

Urine analysis: Normal findings; Stool analysis: Normal findings; CBC: Normal findings.

Thyroid function tests: Normal levels of T₄, T₃ AND TSH. Total iron load normal. Fasting blood glucose is 121 mg/dl. HbA_{1c} is 6. Serum vitamin D low: 9 (average value 30–300).

4. Treatment

Management plans to correct the deficiency for three months and then a daily maintenance dose is to be prescribed. The monitoring of vitamin D serum level is to be assessed to avoid hyper vitaminosis.

Vitamin D supplement was prescribed as oral tabs of 50,000 IU weekly for three months.

Daily maintenance dose of 1000 IU was prescribed.

Outcome excellent result was achieved starting from the first month in the form of decrease in loss, and by the end of three months, the hair was normally regrowing.

The symptoms of fatigability and good mood were also improved.

5. Discussion

Vitamin D is an essential vitamin for our body serving many functions that are necessary for our well-being and health. It is synthesized from a precursor in the skin through the aid of UVB, but the body can also obtain it from diet [2].

Its role in calcium and phosphate homeostasis is well known [7], but its relation to diffuse hair loss is still not very clear, so it is suggested by some authors to assess the serum levels of vitamin D in females with hair loss [13]. Some studies showed an association of vitamin D deficiency with alopecia areata, but clear studies to diffuse hair loss are still lacking.

Diffuse hair fall is one of the common complains encountered in dermatology clinics, which can be due to many factors including diseases of the scalp, for example, Seborreic dermatitis, pityriasis capitis, etc. Some systemic and endocrine diseases and drugs may also be involved in the etiology; in some patients, it can be due to mineral depletion, for example, iron. Stress is also mentioned as a cause of diffuse hair loss.

In this case, all the known causes of diffuse hair loss had been excluded by history, examination and investigations.

An optimal concentration of Vitamin D is needed to delay the aging process and loss of cells including hair [12].

Serum vitamin D in this case was measured and severe deficiency was found. Serum vitamin D deficiency in areas like Sudan is not usually suspected because of the continuous exposure to the sun since the synthesis of vitamin D in the skin requires ultraviolet rays [3]. The deficiency in this case can be justified by the fact that the patient was mostly living indoors in Saudi Arabia for five years. Also, the style of life in Sudan is also changing, where there is a tendency of living in flats and houses with low sun exposure.

The improvement in hair loss was obtained with correction of vitamin D using oral supplements, which of course points to a close relationship between vitamin D deficiency and hair loss.

So, vitamin D deficiency was found to be linked to the different modalities and types of hair losses [14–16]; In this article, vitamin D deficiency was also found to be linked to diffuse hair loss, but moreover correction of this deficiency and follow-up were also done.

6. Conclusion and Recommendations

Vitamin D deficiency is to be considered in patients with diffuse hair loss.

Further studies in this respect are to be conducted.

Health education for being outdoors is necessary to avoid the deficiency of vitamin D.

The use of sun screens should be minimized since they hinder absorption of ultraviolet light, and so reducing the synthesis of vitamin D in the skin leads to its deficiency with all the consequences.

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