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True leukonychia: case reports and review of the literature

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Abstract

Leukonychia refers to the whitening of the nail plate. We identified 22 cases reported in the literature. This study presents two cases of idiopathic leukonychia from Saudi Arabia, which, to our knowledge, are the first reported cases in the region. The first case involves a 26-year-old male with a decade-long history of white discoloration affecting all fingernails. He exhibited low vitamin B12 and elevated thyroid-stimulating hormone (TSH) levels. The second case involves a 23-year-old female with asymptomatic white discoloration on five fingernails and a positive family history of leukonychia in her younger brother. This case series contributes to the limited knowledge of true leukonychia and emphasizes the importance of recognizing its benign nature and distinguishing it from other nail disorders.

Introduction

Leukonychia refers to the whitening of the nail plate and is classified into two types: pseudoleukonychia, resulting from external factors affecting the nail bed, and true leukonychia, which involves the nail matrix or plate. True leukonychia is further divided into four types: punctata, striata, partialis, and totalis.[1] According to Newton's theory, surfaces that reflect visible light appear white. True leukonychia is caused by abnormal matrix keratinization, which prevents visualization of the vascular nail bed, along with perinuclear vacuolization and persistent parakeratosis.[2] It may be acquired or hereditary. Acquired forms may result from chemical exposure, trauma, or infections.[3] Diagnosis is clinical, with dermoscopy assisting in distinguishing true from pseudoleukonychia. Management emphasizes nail care, avoiding irritants, and regular moisturization.[2,3]

Few cases of idiopathic true leukonychia have been reported. We identified 22 cases in the literature. This study reports two cases of idiopathic leukonychia from Saudi Arabia, believed to be the first from the region.

Case Reports

Case 1

A 26-year-old healthy male smoker presented with a 10-year history of white discoloration affecting all fingernails. He works as an accountant and reported no trauma, illness, medication use, or chemical exposure. There was no family history of similar symptoms. Previous topical antifungal treatments were ineffective. Clinical examination showed opaque chalk-white discoloration of all fingernails, with no

toenail involvement (Figure 1A). The color persisted under pressure. Skin, hair, and mucous membranes were unremarkable.

Laboratory findings were mostly normal, except for low vitamin B12 (116 pmol/L) and mildly elevated thyroid-stimulating hormone (TSH, 4.970 mIU/L). Complete blood count (CBC) was normal except for elevated hemoglobin (184 g/L), attributed to smoking. Nail clippings tested negative for fungal elements using periodic acid-Schiff (PAS) and Grocott-Gomori's methenamine silver (GMS) stains; cultures also showed no growth. The patient received vitamin B12 supplementation, which normalized B12 levels but did not improve nail color. Based on history and examination, idiopathic acquired true leukonychia totalis was diagnosed. The patient was reassured of the benign nature of the condition, and follow-up showed no changes in leukonychia.

Case 2

A 23-year-old healthy female presented with asymptomatic white discoloration affecting five fingernails for more than 10 years, without toenail involvement. Her younger brother had similar involvement in one fingernail. There was no history of trauma, illness, medication use, or chemical exposure.

Examination showed porcelain-white discoloration of the right index, middle, and ring fingernails, as well as the left middle and ring fingernails. The whitening affected half of the nail surface, with some nails showing concave borders (Figure 1 B,C). The color did not fade under pressure. Other nails, skin, hair, and mucous membranes appeared normal. Dermoscopy revealed diffuse white color with a smooth, transparent nail plate (Figure 2). Potassium hydroxide (KOH) and PAS fungal tests were negative. Hematological and biochemical tests were all within normal limits.

Discussion

Leukonychia refers to the whitening of the nail plate. It is classified into true leukonychia, which results from abnormal keratinization of the nail matrix affecting the nail plate structure, and apparent leukonychia, which arises from abnormalities in the nail bed and typically fades with pressure, as observed in conditions like liver cirrhosis, renal disease, and trauma. Pseudoleukonychia occurs when the nail plate remains structurally normal, and the white appearance is caused by external factors, such as in onychomycosis.[4]

True leukonychia can be either hereditary or acquired. Hereditary leukonychia is most commonly inherited in an autosomal dominant pattern; however, autosomal recessive cases have also been reported. It may occur in isolation or as part of syndromes. Syndromic associations include sebaceous cysts, renal

stones, and deafness in Bart-Pumphrey syndrome; sebaceous cysts in Bauer syndrome; palmoplantar keratoderma in Vohwinkel syndrome; sensorineural deafness and enamel abnormalities in Heimler syndrome; neural anomalies and epiphyseal dysplasia in Lowry-Wood syndrome; and multiple malformations, including ocular hypertelorism and genital abnormalities, in FLOTCH syndrome. In addition, hereditary leukonychia has been linked to isolated findings such as pili torti, acanthosis nigricans, keratosis pilaris, duodenal ulcers, and gallstones.[5]

Acquired true leukonychia may occur without a known cause (idiopathic) or secondary to factors such as trauma, chemical exposure, arsenic or thallium poisoning, certain medications, inflammatory disorders like psoriasis, or fungal infections such as onychomycosis.[6] One previously reported idiopathic case involved a female patient whose leukonychia resolved spontaneously during pregnancy, suggesting a possible hormonal influence.[7]

In our literature review, we identified 22 published case reports of idiopathic true leukonychia (Table 1).[8-23] The majority of cases involved young or middle-aged male patients. Only one report described a female patient, in whom leukonychia began with menarche and subsided during pregnancy, reinforcing the potential hormonal role.[7] However, the female patient in our study had no menstrual or hormonal associations.

True leukonychia has been described across various ethnic groups. To the best of our knowledge, this report presents the first documented cases from Saudi Arabia. Most cases described in the literature appeared during adolescence or early adulthood, consistent with the age of onset in our patients.[24] True leukonychia affecting the toenails has also been reported in association with hallux valgus, appearing as longitudinal half-and-half nails.[25] In another case, bilateral true leukonychia resolved after correction of a low zinc level.[26] Both of our patients had normal serum zinc concentrations (12 µmol/L and 11 µmol/L, respectively). Although low vitamin B12 levels have not been widely reported as a cause of leukonychia, our first patient did have a deficiency. Interestingly, a previous report documented improvement of leukonychia in a child following a 7-month course of multivitamin supplementation, including vitamin B12, despite initially normal laboratory values.[27]

Conclusions

Idiopathic leukonychia is a rare, benign, acquired condition that may be mistaken for systemic disease or fungal infection. Greater awareness of its clinical features can help prevent unnecessary investigations and prolonged treatment.

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Figure 1. A) Idiopathic leukonychia in a 26-year-old male showing chalk-white discoloration of all fingernails; **B)** porcelain white discoloration on the fingernails of a 23-year-old female; **C**) similar discoloration on the single fingernail of her younger brother.

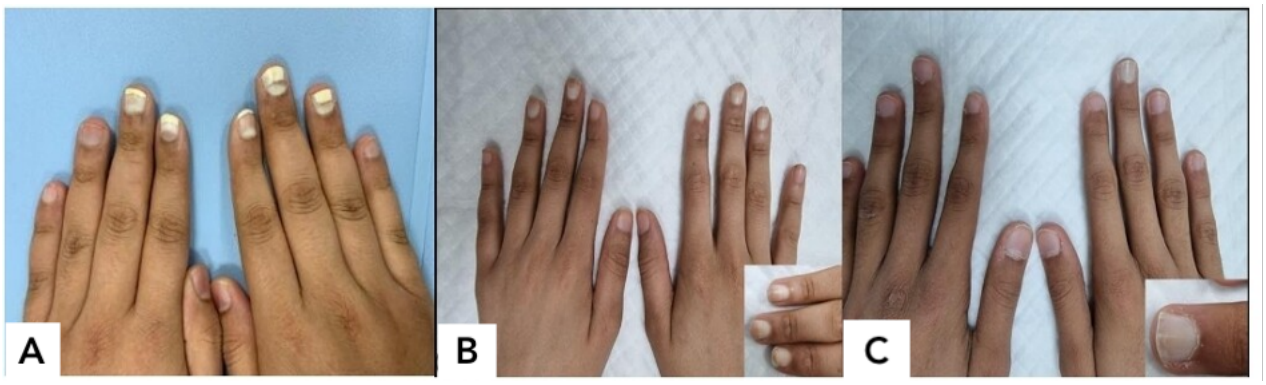

Figure 2. Dermoscopic image showing diffuse white color with a smooth nail plate.

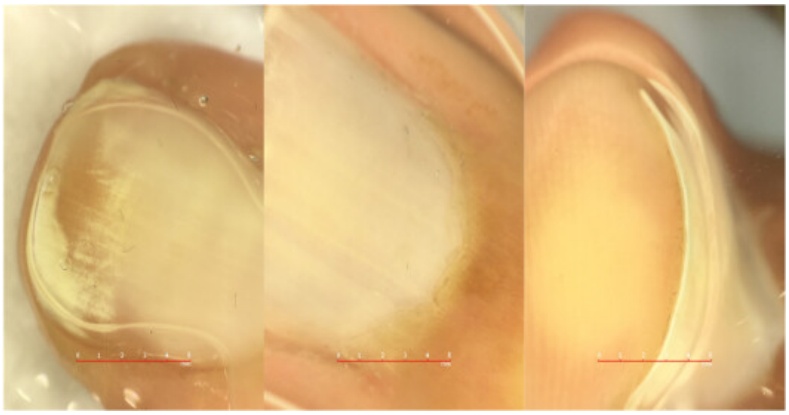

Table 1. Summary review of reported cases of idiopathic leukonychia.

Case (year of publication)	Gender/Age (years)	Clinical features	Investigations	Association / family history	Treatment and follow up
Eller, *et al.* (1928)[8]	Male, 15	Leukonychia totalis (LT) for 1 year	The original document is not available		
Stewart, *et al.* (1985)[9]9/24/25 4:19:00 PM	Male, 23	LT and Leukonychia partialis (LP) for 10 years.	All within normal limits	No associations or family history	No treatment reported
Lee, *et al.* (2004)[10]	Male, 26	LT of all fingers except the left thumb for 13 years	Not reported		
Park, *et al.* (2005)[1]	Male, 26	LP to LT for 13 years	The left thumb nail tested positive for potassium hydroxide, and *Trichophyton rubrum* was cultured. Other tests were normal	No associations or family history	Intralesional injections of corticosteroid with no benefits after 2 months
Chaudhry, *et al.* (2006)[7]	Female, 31	Transverse leukonychia started when she was 12 years with her menses	All within normal limits	No associations or family history	Har nails turn back to normal during the third trimester of pregnancy
Claudel, *et al.* (2005)[11]	Male, 12	LT and LP for 1 year. He took prednisone prior to the nail changes, and he was on albuterol inhaler. His leukonychia has continued although his asthma has been controlled and no longer requires treatment	All within normal limits	A known case exercise-induced asthma, his uncle had alopecia areata	No treatment reported
Bongiorno, *et al.* (2009)[12]	Male, 34	LP of both the fingers and LT for 11 years	Not reported	No associations or family history	No treatment reported
Arsiwala, *et al.* (2012)[3]	Male, 35	LT of the fingernail, and LS of the toenails for 23 years	All within normal limits	No associations or family history	No treatment reported
Bakry, *et al.* (2014)[13]	Male, 12	LT for 8 years	All within normal limits	No associations or family history	No treatment reported

Kim, *et al.* (2014)[14]	Male, 19	LT and LP of the toenails for 1 month	All within normal limits	No associations or family history	No treatment reported
D'Souza, *et al.* (2014)[27]	Male, 10	LP to LT for 6 years	All within normal limits	No associations or family history	Zinc and amino acid supplementation, series improvement was noted with complete resolution of the lesion after 7 months. The supplements were discounted 3 months following the resolution, and for 6 months no recurrent of leukonychia was noted
Dlova, *et al.* (2014)[4]	Male, 20	LT for 8 years	All within normal limits	No associations or family history	No treatment reported
	Male, 12	LP and LT since birth	All within normal limits	No associations or family history	No treatment reported
Verma, *et al.* (2014)[15]	Male, 24	LT of fingernails for 5 years, LP of toenails for 2 years	All within normal limits	No associations or family history	No treatment reported
Neki, *et al.* (2014)[16]	Male, 29	LT for 9 years	All within normal limits	No associations or family history	No treatment reported
Angoori, *et al.* (2015)[17]	Male, 30	LT, since childhood	All within normal limits	No associations or family history.	No treatment reported
	Male, 32	LT for 24 years.		Associated with polymorphic light eruption	No treatment reported
Canavan, *et al.* (2015)[18]	Male, 25	LT and LP for 1 year	All within normal limits	Known case of sickle cell anemia. He was treated with 6 months of oral terbinafine and 3 months of itraconazole for possible onychomycosis. No family history or other associations	No treatment reported
Das, *et al.* (2016)[24]	Male 14,	LT for 10 years	All within normal limits	No associations or family history	No treatment reported
Mathachan, *et al.* (2020)[19]	Male, 20	LT and LP for 1 year	All within normal limits	No associations or family history	No treatment reported
	Male, 18	LT for 3 years	All within normal limits	No associations or family history	No treatment reported
Freeman, *et al.* (2021)[20]	Male, 17	LT for 6 years	All within normal limits	No associations or family history	No treatment reported
Pandey, *et al.* (2022)[21]	Male, 17	LT and LP for 3 years	All within normal limits	No associations or family history	No treatment reported

Lin, *et al.* (2024)[22]	Male, 8	LT for 1.5 year. There is erythema, some edema, and skin peeling along some of his lateral and proximal fingernail folds	All within normal limits	Allergic rhinitis on no treatment. He was diagnosed with chronic nail fold eczema. After six months, the patient's fingernail fold eczema improved with mometasone furoate 0.1% cream and White Paraffin, but his leukonychia showed only slight improvement	No treatment reported
Almaani, *et al.* (2024)[23]	Male, 22	LT for 7 years. It resolved spontaneously and reoccurred through the years	All within normal limits	No associations or family history	No treatment reported
Ahmed, *et al.* (2025) (Our case)	Male, 26	LT for 10 years	All within normal limits except vitamin B12, which was 116 pmol/L, and mild elevation of TSH level, which was 4.970 mIU/L	No associations or family history	No treatment reported
	Female, 23	LP and LT for more than 10 years	All within normal limits	Her brother had single nail involvement	No treatment reported

LT, leukonychia totalis; LP, leukonychia partialis; LS, leukonychia subtotalis.