

Yellow dermatology: Highlighting its diagnostic and teaching challenge

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Abstract

Objective There are many skin diseases that might present as yellowish skin lesions initially or during the course of the disease. The objective of the study is to record all patients that have yellowish rash during the progress of the disease, according to daily clinical practice and their importance in dermatology and general medicine.

Methods All patients that had yellowish skin rash during the course of the disease were enrolled during the period from February 2014 to March 2021. They were well-assessed and classified. Clinical photographs with some histopathological findings were recorded.

Results The following diseases were classified to have yellow skin rash initially or during the course of the disease and their frequencies were calculated, in addition to the medical importance to patients and dermatologists: 1- Histiocytosis- xanthogranuloma group. 2- Xanthoma groups. 3- Xanthomatous morphea. 4- Keratoderma. 5- Calcinosis cutis. 6- Systemic sclerosis. 7- Pseudoxanthoma elasticum. 8- Papular mucinosis. 9- Necrobiosis lipidica. 10- Xanthomastocytoma. 11- Yellow nail syndrome. 12- Ecchymosis. 13- Nevus sebaceous. 14- Sebaceous hyperplasia. 15- Nevus anemicus. 16- Yellow teeth. In addition, anemia and jaundice usually present as generalized yellowish skin discoloration.

Conclusion Yellow dermatology is a group of diseases that characteristically presents with yellowish skin lesions initially or during the progression of the disease. They are classified as informative in medical practice and teaching sessions. The cause of this color is different according to the disease status, as it could be fat deposition, fat engulfing cells, connective tissue degeneration, sebaceous cells hyperplasia, hemoglobin and hemosiderin deposition, vasoconstriction, or unknown reason.

Key words

Lipid; Yellow; Pigment; Xanthoma.

Introduction

The color of cutaneous lesions and their shape, distribution are of great help in the diagnosis of dermatological diseases. Furthermore, the colors indirectly give us information about their chemical composition, and therefore allow us to know the nature of the lesions better.

Similarly, color is a very essential part of

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dermatological manifestations as the diseases and their lesions might take different characteristic colors. These colors might have very diagnostic value in diseases like heliotropic rash of dermatomyositis and blue color of nevus of Ota. Yellow color is also important in dermatologic practices like in patients with xanthoma, nevus sebaceous, necrobiosis lipidica, sebaceous hyperplasia, etc.

The clarification of color has been an important part of human development and is evolutionarily united with different behavioral and physiologic responses.¹ The three qualities of visible light include value (lightness or darkness), hue (color) and chroma (purity).² Color (hue) is the clearest visible characteristic of use in clinical evaluation. A range of pathophysiologic mechanisms may develop and give a yellow hue which is explored in this study to help dermatologists with the diagnosis of skin diseases with a yellow hue. Yellow is the color that the human eye perceives, when it receives light with a dominant wavelength between 570-590nm.³

Yellow light is reflected by a diversity of natural sources and is based on the chemical and structural composition of the reflecting surface.⁴ The color of normal and diseased skin is determined primarily by pigments and is a dynamic procedure responding within hours to illness.^{5,6}

To build a uniform lexicon for describing color in the skin, it has been suggested that all structural and chemical items that convey color to the skin be called chromophores, which is the section of molecule responsible for its color.^{4,5}

The recognized color of light reflected from the skin is relatively determined by skin structure including epidermal thickness and dermal collagen thickness and quality.^{4,5,7} The proximity

of subcutaneous fat to the skin surface in thin skin may contribute to a yellow appearance of the skin in involved areas.⁸

Yellow skin diseases are a heterogenous group composed of abnormalities in fat metabolism, elastic and connective tissue, keratin, and other states of inflammatory, metabolic, or organ dysfunction. Patients will present in several ways, and skin lesion may appear before or follow systemic disease. Dermatologists have a fundamental role in recognizing those with systemic associations to ensure early diagnosis and treatment.

The aim of this study is to collect and classify all patients that have yellowish rash that initially shows yellow discoloration or might appear during the progress of the disease and to record these patients according to daily clinical practice and their importance in dermatology and general medicine.

Methods

This is a case series descriptive study that was conducted during the period from February 2014 to March 2021.

All patients that had yellowish skin rash during the course of their disease were reviewed, recorded, evaluated and classified. This study followed the Declaration of Helsinki Principles and consent was taken from each patient or his/her parents before clinical photograph and after explanation about the aim of the study.

A full history was taken from each patient or his/her parents including age, gender, occupation, address, age at onset, family history of similar problem, drug history, associated cutaneous symptoms/ diseases and past medical and surgical history. For each patient, a full clinical examination was performed to evaluate the

morphological distribution and extent of the skin lesions, in addition to complete systemic examination.

Diagnosis was based mainly on clinical presentation in conjunction with the clinical examination and the associated symptoms. However, skin biopsies with a pathological stained section with Hematoxylin and Eosin (H&E) stain were performed in selected patients. Laboratory investigations were done according to the suspected disease.

Results

The following diseases were classified to have yellow skin rash initially or during the course of the disease:

1- Histiocytosis- xanthogranuloma group: The cutaneous Langerhans and non-Langerhans cell histiocytoses are characterized by a proliferation of histiocytes of unknown etiopathogenesis, presenting with yellowish papules, plaques, or nodules due to lipid-laden histiocytes⁹ (**Figure 1**).

2- Xanthoma groups: The deposition of lipid both intracellularly and in the dermis produces a range of yellow lesions known as xanthomata¹⁰ (**Figure 2**).

3- Xanthomatous morphea: Excessive collagen deposition causes morphea, which is identified by the hardening and thickening of the skin and subcutaneous tissue.¹¹ A unique type of morphea, known as xanthomatous morphea, displays a yellow discoloration due to the degeneration of connective tissue. This is the first study documenting this variety of morphea (xanthomatous morphea) (**Figure 3A**).

4- Keratoderma presents with thickened yellow plaques on palms and soles¹² (**Figures 3B&C**).

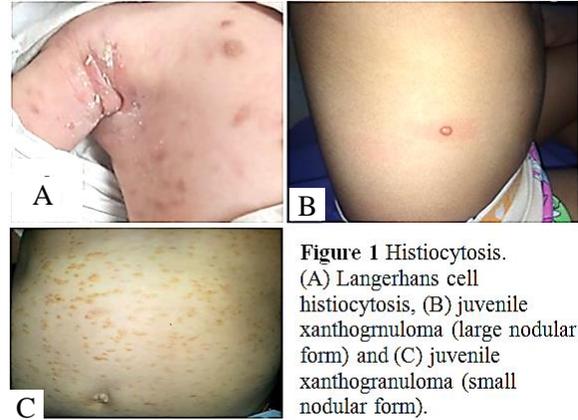


Figure 1 Histiocytosis. (A) Langerhans cell histiocytosis, (B) juvenile xanthogranuloma (large nodular form) and (C) juvenile xanthogranuloma (small nodular form).



Figure 2 Twenty three years old male with eruptive xanthoma involving the buttock.

5- Calcinosis cutis is the accumulation of calcium salts in the skin and subcutaneous tissue. There are five subtypes of calcinosis cutis: dystrophic, metastatic, iatrogenic, idiopathic, and calciphylaxis¹³ (**Figure 3D**).

6- Systemic sclerosis is an autoimmune connective tissue disease of unknown cause. The clinical hallmark of the disease is skin sclerosis.¹⁴

7- Pseudoxanthoma elasticum is a multi-system, autosomal recessive disorder characterized by clumped, distorted, and calcified elastic fibers. Cutaneous lesions consist of yellowish papules, cobblestoning or larger coalescent plaques, typically located on the neck and the flexural areas^{15, 16} (**Figure 4**).

8- Papular mucinosis is a variety of mucinosis

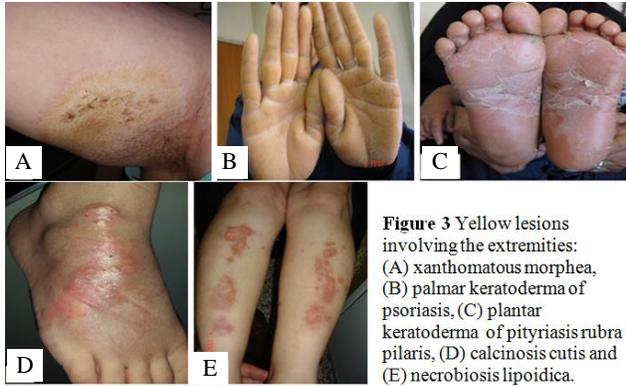


Figure 3 Yellow lesions involving the extremities: (A) xanthomatous morphea, (B) palmar keratoderma of psoriasis, (C) plantar keratoderma of pityriasis rubra pilaris, (D) calcinosis cutis and (E) necrobiosis lipoidica.

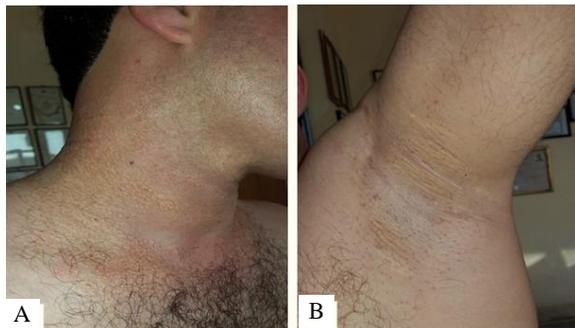


Figure 4 Twenty-eight years old male with pseudoxanthoma elasticum (A) right lateral neck and (B) left axilla showing linear and reticulate yellow papules.

characterized by excessive deposition of mucin in the dermis. It manifests itself with papules or plaques in different sites of the body¹⁷ (**Figure 5A**).

9- Necrobiosis lipoidica is a chronic granulomatous disorder that is usually associated with diabetes mellitus, characterized by yellow–orange atrophic plaques on the pretibial aspect in young to middle-aged adults¹⁸ (**Figure 3E**).

10- Xanthomastocytoma: Mastocytosis is a disorder characterized by mast cell proliferation and accumulation within various organs, most commonly the skin. Cutaneous lesion can present as erythematous yellowish nodules or plaques in infancy and early childhood¹⁹ (**Figure 6**).

11- Yellow nail syndrome is generalized yellow discoloration of the nails. The nails are thickened and longitudinally and transversely

over curved with loss of the lunula²⁰ (**Figure 7A**). In this study, according to our experience, psoriasis is the commonest cause of yellow nail syndrome or it may be idiopathic as it responds well to topical and systemic steroids.

12- Ecchymosis: Blood leaks from ruptured capillaries into the skin and subcutaneous tissue, causing a noticeable discoloration of the skin. As the lesion heals, the ecchymotic area can change from purple or dark blue to yellow or green²¹ (**Figure 7B**).

13- Nevus sebaceous is a congenital disorder presenting in infants as slightly elevated, yellow, orange, or tan-colored plaques with a velvety surface, it most commonly occurs on the forehead²² (**Figure 5B**).

14- Sebaceous hyperplasia is the term used for enlarged sebaceous glands seen on the cheeks or forehead of the middle-aged and elderly people. It appears as small yellow papules²³ (**Figure 5C**).



Figure 5 Yellow lesions involving the face: (A) papular mucinosis, (B) nevus sebaceous and (C) sebaceous hyperplasia.

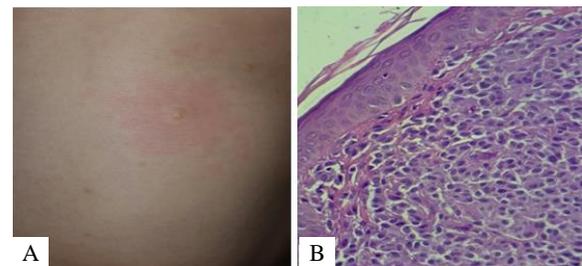


Figure 6 (A) Xanthomastocytosis in 2 years old child and (B) histopathology for the same patient showing an accumulation of mast cells in the dermis (H&E, 10×).



Figure 7 Miscellaneous yellow lesions, showing: (A) yellow nail syndrome, (B) ecchymosis, (C) nevus anemicus and (D) yellow teeth.

15- Nevus anemicus: It is a pale macular skin area, often with polycyclic borders, caused by permanent vasoconstriction in the superficial dermis. It appears at birth or during childhood, predominantly on the trunk²⁴ (**Figure 7C**).

16- Yellow teeth: yellow teeth discoloration is one of the most common complaints among patients requiring aesthetic treatment. It can be affected by both intrinsic and extrinsic factors, from ingesting chemicals to eating foods that cause yellow discoloration²⁵ (**Figure 7D**).

In addition, anemia, carotenemia and jaundice usually present as generalized yellowish skin discoloration.

Discussion

Color is very essential whether in nature or in dermatology as it could be very helpful to classify things. In an attempt to describe every lesion in dermatology whether large or tiny, dermatologists often start by its color whether erythematous, whitish, violet, pigmented, pinkish, etc.

The significance of yellowish discoloration, although commonly mentioned, is rarely documented in the medical literature. The objective of the current study is to gather and classify all skin diseases that manifest with yellowish discoloration either initially or during

the progress of the diseases.

As yellowish discoloration is not a diagnosis and it's usually a feature of underlying cutaneous or systemic diseases, in the present study, the patients were evaluated according to the significance of causative skin diseases and their importance in different societies.

Unfortunately, no published studies exist regarding the significance of these yellow skin lesions or their associated or underlying diseases, so, to the best of our knowledge, this current work will be the first extensive study assembling these diseases into groups providing a contributory approach for diagnostic, academic and teaching purposes.

In many diseases, the etiopathogenesis of this yellow discoloration cannot be fully explained and clarified. This color may result from degeneration of connective tissue as in pseudoxanthoma elasticum, systemic sclerosis, necrobiosis lipoidica. Xanthomatous morphea is a novel entity is described by the present work for the first time. This color could be attributed to connective tissue degeneration of the dermis.

While in other diseases, fat deposition in the dermis, whether it is free or engulfed by macrophages, is the reason behind the yellow discoloration that is commonly seen in different types of xanthomas and some varieties of histiocytosis like xanthogranuloma.

Cutaneous mastocytosis, although typically more hyperpigmented, can present as erythematous yellowish nodules or plaques in infancy and early childhood.²⁶

In patients with keratoderma of the palms and soles, the yellow discoloration can be attributed to the excessive thickening of epidermis commonly seen in congenital or acquired keratoderma as seen in psoriasis, lichen planus,

pityriasis rubra pilaris. Additionally, in calcinosis cutis, a deposition disorder, the patient can present with yellow/cream colored papules and nodules usually on the limbs.^{27,28}

In yellow nails, the most recorded etiology according to our experience, is psoriasis. This observation is in contradiction to what was previously recorded in the literature where there is association with lymphedema and respiratory tract involvement.²⁹ Although dermatophytic infections are a common problem among the Iraqi population, chronic onychomycosis is rarely reported as a cause of yellow nail syndrome.

Ecchymosis is well known to cause yellowish discoloration of the skin as a result of sequential degradation of hemoglobin into biliverdin, which then converts to bilirubin (responsible for yellow color) and then to hemosiderin. In most cases, the cause is traumatic. Spontaneous ecchymosis can occur in elderly people. Some patients, especially young females, may present with recurrent idiopathic bruising which ultimately leaves yellow discoloration.³⁰

Sebaceous hyperplasia is commonly seen in middle-aged and elderly people and nevus sebaceous is commonly seen in infants and children. In both conditions, the yellowish discoloration can generally be attributed to the hyperplasia of the sebaceous glands.

In some others, like nevus anemicus, a condition is manifested as a result of vasoconstriction of small blood vessels in the skin rather than an actual abnormality in the skin.

The etiology of yellow discoloration in carotenemia, anemia, and jaundice was fully explained with well documented etiopathogenesis.

Lastly, yellow teeth are a reflection of many

etiologies ranging from chemical ingestion to consumption of foods.²⁵

Finally, we hope that this article gives greater prominence to the skin lesions with yellow discoloration in dermatological diagnosis.

Conclusion

Yellow dermatology is an essential part of clinical dermatology which is very helpful for diagnosis and useful for teaching purposes. These are a group of diseases that are characteristically showing yellowish skin lesions, initially or during the progression of the disease. Yellow skin lesions are well classified in the present work and will be informative in medical practice.

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