



A Literature Review of Chromhidrosis

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1. ABSTRACT

The rare illness known as chromhidrosis, which is differentiated by the production of colored sweat, is an exciting but difficult feature of dermatology. Despite the fact that this is a mild ailment, a greater understanding of its pharmacology and prospective treatments is essential due to the psychosocial impact it has on those affected. This extensive analysis aims to clarify the fundamental mechanisms of chromhidrosis by looking into the pharmacological aspects of pigment metabolism, sweat gland function, and potential treatment options. The study covers current advances in pharmacotherapy and addresses the benefits, downsides, and possible applications of topical agents, systemic medications, and surgical procedures, among other therapeutic modalities. The review also highlights the need for more research to improve our understanding and management of chromhidrosis by discussing new research directions and open topics in the area.

Keywords- Chromhidrosis, Sweat gland anatomy, Types of chromhidrosis, Treatment, Case studies, Future directions, etc.

2. INTRODUCTION

A rare disorder known as chromhidrosis is distinguished by the release of colored sweat. Yonge made the first diagnosis in 1709. Shelley and Hurley discovered in 1954 that lipofuscin granules were the source of the colored sweat associated with chromhidrosis. The term "chromhidrosis" derives from the Greek words "croma" (colored) and "hidrosis" (sweat). While it can occur at any age, puberty is when it is most noticeable.^[1]

Apocrine chromhidrosis Unknown Chromhidrosis occurs in the apocrine glands. Apocrine chromhidrosis is most common in the trunk and areola, although it also occurs in the anogenital, axillary, eyelid, ear, and scalp regions. Normally, apocrine glands inject small amounts of an odorless, oily fluid into hair follicles. When microorganisms break down the fluid and it reaches the skin's surface, it emits a pheromone-like odor.^[1]

Eccrine chromhidrosis As the number of eccrine glands varies according on the location of the skin (e.g., ear canal; lips; prepuce; glans penis; clitoris; labia minor; etc.), chromhidrosis can occur on almost any part of the body. Eccrine glands are smaller than apocrine glands. They quickly produce a little amount of salty perspiration on the skin's surface, which is primarily composed of water and/or electrolytes. The sympathetic nervous system regulates the distribution of these glands. The epidermis, or the pads of your fingers, contains an unequal distribution of epidermal glands. The epidermis' creases are free of pores. They are essential for preserving the skin's barrier, controlling blood flow, and releasing electrolytes.^[2]

Pseudo chromhidrosis Colored sweat is formed when colorless eccrine sweat combines with other substances, resulting in pseudo chromhidrosis. Yellow, red, pink, blue, green, brown, and black are the most common colors used to target the face, neck, and hands.^[3]

3. LITERATURE REVIEW

3.1 SWEAT GLAND

Sweat evaporation from the skin's surface is important for human thermoregulation, and this is especially evident when the ability to sweat is reduced during periods of severe physical exertion and/or exposure to hot settings.^[4]

3.1.1 Types of Sweat glands

This section compares and contrasts the three types of sweat glands. Eccrine sweat glands are the most abundant, covering virtually the whole body surface area and accounting for the majority of sweat emission. Apocrine glands, on the other hand, play a smaller role in overall sweat production because they are only found in certain parts of the body.^[5]

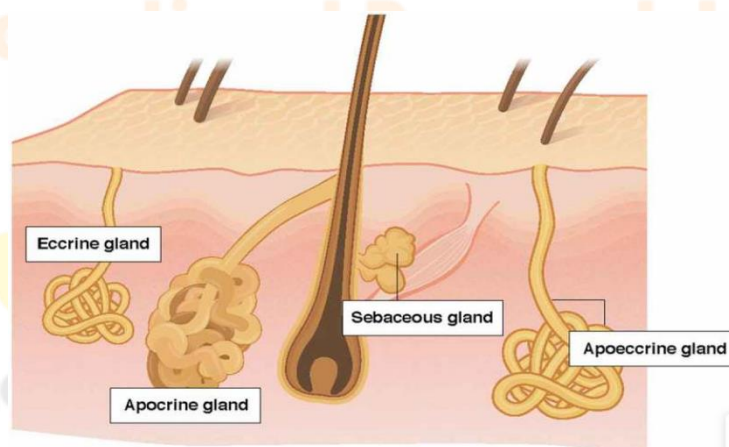


Fig. No.1 Comparison of the apocrine, eccrine, and apocrine glands in the axilla.

Eccrine sweat glands

The eccrine glands are the most prevalent type of sweat gland, they are also known as the small gland variety. The eccrine sweat glands on both glabrous (soils and palms) and non-glabrous (hair-covered) human skin number around 2-4 million.^[6]

Apocrine sweat glands

The apocrine gland is a second type of sweat gland, which are located primarily in the axilla, breasts, face, scalp, and the perineum. These are larger and open into hair follicles instead of onto the skin surface.^[7]

3.2 SYMPTOMS

The color may just impact sweat in specific locations or all over the body.^[9] It can cause sweat to turn: Red, black, green, yellow, brown and bluish.^[8]

3.4 CAUSES

One of the primary causes of chromhidrosis is an excess or accumulation of Porphyrins in sweat glands. When Porphyrins accumulate in the sweat glands, perspiration may color red, pink, or brown. Certain medications or dyes, when swallowed or used topically, can cause chromhidrosis. For example, the use of medicines such as rifampicin, minocycline, and chlorpromazine has been related to chromhidrosis. Similarly, the usage of hues like Sudan black and tattoo ink has been linked to the disease. Chromhidrosis may be associated with underlying medical conditions such as hyperthyroidism, dermatitis herpetiformis, or multiple myeloma.^[9]

3.5 TYPES OF CHROMHIDROSIS

The chromhidrosis is categorized by their sweat colour and secretion of sweat gland.

- Apocrine chromhidrosis
- Eccrine chromhidrosis
- Pseudo-chromhidrosis

3.5.1 APOCRINE CHROMHIDROSIS:

This affects areas that contain apocrine sweat glands, such as the torso, eyelids, scalp, ears, and areola — the darker area of skin around the nipple.^[10]

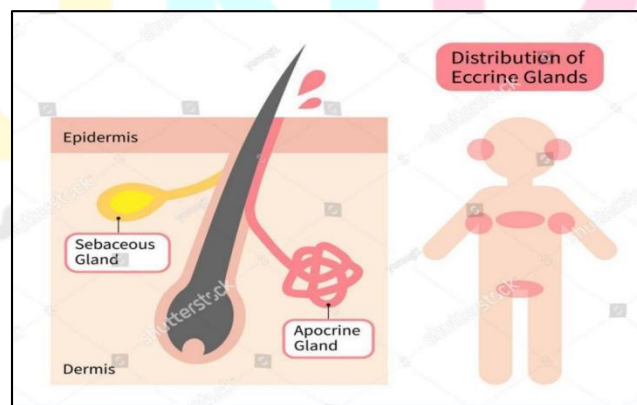


Fig. No.2 Distribution of Apocrine gland and Apocrine Chromhidrosis

Symptoms

Yellow is the most common color of axillary staining.

An aura of warmth or a prickly sensation prompted by emotional or physical stimuli may precede the onset of colored sweat.

Facial apocrine chromhidrosis is rarely described. It occurs most frequently on the cheeks and malar eminences.^[11]

Causes

Apocrine chromhidrosis is hypothesized to result from an increase in the amount of lipofuscin granules in apocrine secretory cells. In people the discoloration usually happens because the person has ingested- Water-soluble dyes, Heavy metals, such as copper, Certain food colouring or flavorings, Certain medications, such as bisacodyl, a laxative, when it is coated in tartrazine, a yellow dye.^[12]

Diagnosis of Chromhidrosis

- Wood lamp examination may show yellow fluorescence
- Microscopy of freshly-expressed discolored sweat demonstrates the lipofuscin granules
- A skin biopsy confirms the diagnosis if PAS-positive lipofuscin pigment granules are found within the apical cells of apocrine glands.
- Tests of urinary homogentisic acid levels to exclude alkaptonuria.
- Clothing fibers in contact with the secretions may also fluoresce yellow-green with standard UV microscopy.^[13]

Treatment

● Topical Medications

Topical capsaicin cream lowers substance P. It inhibits the acetylcholine-mediated sweat release at sympathetic nerve terminals, Applying topical aluminum chloride.^[14]

● Botulinum Toxin Injections

Injecting botulinum toxin into the afflicted sweat glands can temporarily stop sweat production and relieve discomfort.^[15]

● Antiperspirants

Topical agents that reduce sweat production and pigment excretion.^[15]

● Psychological Support

Addressing emotional distress and providing coping strategies.^[16]

● Surgical Options

In severe situations, surgical procedures such as sweat gland excision or sympathectomy may be recommended.^[16]

Clinical features

Apocrine Chromhidrosis presents with coloured sweat localised to the distribution of the apocrine glands in the axillae, on the face (particularly the cheeks), breast areolae, and anogenital regions. Sweat may be coloured blue, black, green, brown, or yellow, depending on the oxidation state of the lipofuscin, staining the skin and clothing.^[17]

Case Studies

Case 1: A 60-year-old postmenopausal female presented with a complaint of bluish discharge on the dorsum of her right foot for the last ten days. It increases in quantity during physical exercise and emotional stress. There are no abnormalities in the surrounding skin or skin on other parts of the body. There is no history of taking any relevant drugs (such as multivitamins), hormone replacement treatment (HRT), or testosterone cream. No history of dietary changes, occupational exposure, or exogenous substance use (which rules out pseudochromhidrosis). The patient reported a burning feeling in her foot after applying the capsaicin gel, but she tolerated it well after that. She also reported decreased sweating over her foot.^[18]

Prognosis and Complications

Apocrine chromhidrosis is a benign, persistent disease. It gradually regresses with advancing age, as the apocrine glands become less active.^[19]

3.5.2 ECCRINE CHROMHIDROSIS:

Eccrine sweat glands are widely dispersed, therefore sweat can be found in practically every part of the body.^[20]

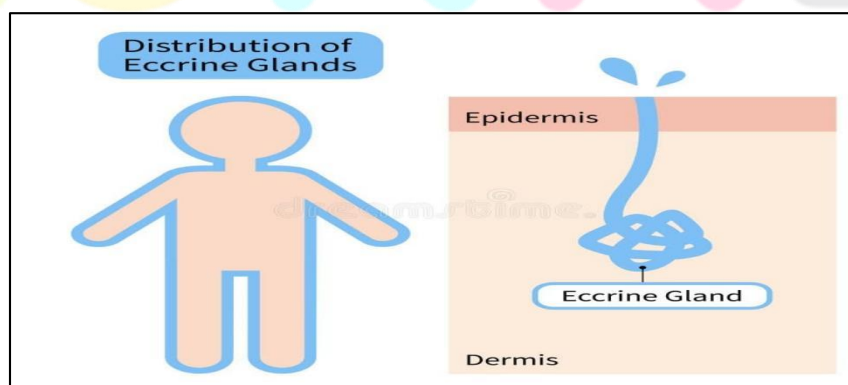


Fig. No.3 Distribution of Eccrine gland and Eccrine Chromhidrosis

Symptoms

Chromhidrosis can cause perspiration to be a bright yellow color instead of the typical clear, salty fluid.^[21]

Causes

Eccrine chromhidrosis can be caused by various exogenous factors, one of which is chromogenic bacteria, notably those in the *Corynebacterium* genus. Examples include: Ingestion of medications, metals, and dyes including tartrazine-coated bisacodyl laxatives, quinine, rifampicin, clofazimine, methylene blue, mercury, and copper, Excessive consumption of beta-carotene/carotenaemia and other food additives/colouring agents, Hyperbilirubinaemia, Uremia.^[22]

Diagnosis of Chromhidrosis

- Dermoscopy to examine the character and location of the pigment
- Skin biopsy to distinguish from apocrine chromhidrosis
- Liver function and kidney function tests
- Skin scraping and culture to exclude chromogenic bacteria
- Wood lamp skin examination to exclude apocrine chromhidrosis, which may show yellow fluorescence.^[23]

Treatment

To reducing or eliminating contact with the dye, chemical, or heavy metal responsible for the discoloration.

Botox Injection: Temporary cessation of sweat production through the inhibition of nerve signals.^[24]

Clinical features

Eccrine chromhidrosis can affect the skin over any body area but is often worst on the palms and soles where eccrine sweat glands are most concentrated. The colour of the sweat depends on the dye, drug, or chemical involved, with red, blue, orange, brown, yellow, green, black, and white sweat reported.^[23]

Case Studies

Case 1: A 28-year-old North Indian female presented with complaints of black stains of undergarments over her breasts for the previous five to six years. Staining was more visible during the summer. There was no history of relevant drug use throughout this time, including oral contraception. Examination revealed a heavy black fluid above the breast areola, which could be released as several droplets when the surrounding area was squeezed. The surrounding skin had a normal appearance. Apocrine chromhidrosis was diagnosed based on the patient's medical history and clinical examination. The secretion decreased in amount after two weeks of application. However the burning sensation reduced gradually in intensity and became tolerable. Erythema had also decreased.^[24]

Apocrine chromhidrosis is a localized disease predominantly affecting the skin bearing apocrine glands. Two varieties are described-axillary and facial. Colored sweating can be induced by physical activity and emotional factors and patients are usually able to express out the sweat droplets mechanically. Substance P is found primarily in afferent sensory fibers, dorsal root ganglia and the dorsal horn of the spinal cord. Prolonged use leads to depletion of substance P in the unmyelinated, slow-conducting type C sensory fibers. However, the exact mechanism of action in apocrine chromhidrosis is not known. Probably it inhibits the acetylcholine mediated release of sweat at the sympathetic nerve endings.^[24]

Prognosis and Complications

Elimination of the causative agent or treatment of the underlying condition results in resolution of the discoloration.^[25]

3.5.3 PSEUDO-CHROMHIDROSIS:

This results when dyes, chemicals, or pigment-producing bacteria mix with colorless eccrine sweat to form colored sweat.^[26]

Symptoms

The sweat can become discoloured by chromogenic bacteria and fungi including: *Serratia marcescens* has been associated with pink-red sweat. *Pseudomonas aeruginosa* has been associated with green-blue sweat.^[27]

Causes

Pseudo-chromhidrosis can be caused by various exogenous factors, one of which is chromogenic bacteria, notably those in the *Corynebacterium* genus. It occurs when the skin comes into contact with: Chemicals, Dyes, Pigment-producing bacteria especially *Corynebacterium* species, fungi, Paints.^[28]

Diagnosis of Chromhidrosis

Skin scraping and culture to exclude chromogenic bacteria (the cause of pseudo-chromhidrosis).^[29]

Treatment

Treatment is most commonly with antiseptic soap and/or antibiotics including topical clindamycin, topical and/or oral erythromycin for 1 to 2 weeks, even when culture-negative. Any predisposing cause for the infection, such as use of a topical steroid, should be ceased. When an exogenous chemical or dye has been identified as the cause, avoidance quickly resolves the condition. Pseudo-chromhidrosis treatment may involve using antimicrobial medications or stopping other medications and thus allowing the skin's natural population of bacteria to re-balance.^[30]

Clinical features

Pseudo-chromhidrosis can affect any body area, however face, neck and palms are the most commonly involved sites. The colour of the sweat depends on the underlying chromogen or dye. The stain may be seen on the skin or clothing, and can be removed with a moistened wipe or alcohol swab.^[31]

Case Studies

Case : A 9-year-old youngster weighing 28 kg appeared with gradual red staining of his face. He was treated for cheilitis for 1½ months. After 10 days of using a new emollient (including urea, light liquid paraffin, white soft paraffin, and glycerol), he began to experience lip irritation, pain, and swelling. The emollient was discontinued, and the itching and soreness subsided gradually. Cutaneous examination revealed diffuse erythema on the face, as well as mild exfoliation of the skin on the lips and around the mouth.^[61] However, the child was completely asymptomatic and redness completely disappeared after bath. Normal-colored skin was revealed when rubbed firmly with absolute alcohol. No autofluorescence of sweat was noted under the Wood's lamp. A revised clinical diagnosis of pseudo-chromhidrosis was made. However, the clindamycin lotion had to be discontinued because it caused considerable pain and irritation to the lips. The final diagnosis was pseudo-chromhidrosis as a result of secondary infection following irritating contact dermatitis of the lips.^[32]

Prognosis and Complications

Pseudo-chromhidrosis resolves once the cause has been identified and removed or treated.^[33]

3.6 FUTURE DIRECTIONS

Apocrine chromhidrosis is a benign chronic condition. It slowly regresses with advancing age as the apocrine glands gradually become less active.^[34]

4. CONCLUSION

The chronic exposure to agents that alter intra-cellular oxidoreduction potential such as copper and ammonium may cause Chromhidrosis. The coloration may be barely noticeable and restricted to a few locations or more widespread. Chromhidrosis is harmless, but it can cause embarrassment or distress that may lead to depression or anxiety. If sweat changes color, contact a doctor, who may rule out other causes before diagnosing chromhidrosis. Anyone who has chromhidrosis and experiences any emotional distress should let a healthcare provider know. Although it is usually a benign condition, it is important to analyze the urine organic acid profile, especially in young patients, who must be followed for possible liver toxicity. Further studies are needed to elucidate the pathogenesis of Chromhidrosis.

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