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Approach to Disorder of Sweating

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ABSTRACT

Physiological sweating is required for normal mechanism of thermoregulation. Hyperhidrosis is characterized by sweating in excess of physiological amount necessary for thermal homeostasis. Hyperhidrosis can be primary disorder or secondary to underlying disorders.

Though hyperhidrosis is not a fatal condition, but can have serious social, emotional & professional consequences. It is important to be aware of this disorder because the individuals may often do not seek clinicians help because of social inhibition. Currently, wide arrays of local and systemic therapies are available for the treatment of hyperhidrosis. Awareness about availability of various treatment modalities helps in planning and customizing the therapy for the patient to have better quality of life and prevent complications.

INTRODUCTION

Sweating is a common physiological phenomenon. The sweat glands are designed to participate in compensatory thermoregulatory mechanism. Hyperhidrosis is sweating in excess of physiological amount necessary to maintain thermal homeostasis, it is also known as polyhidrosis or sudorrhoea. It is difficult to define excessive sweating; however, the level of hyperhidrosis that affects the quality of life is a good indicator of conventional definition.[1] The individuals often delay in seeking help as there could be apprehension.[2]

We can grade the pathological sweating as mild, moderate & profuse. Several conditions can cause mild hyperhidrosis, a few conditions can produce moderate hyperhidrosis whereas a very few conditions can produce profuse sweating. Clinicians can make a sensible analysis to know the cause and select appropriate available treatment options.

Hyperhidrosis may not contribute to any mortality but, can lead to psychosocial disturbances, personal discomfort, and occupational low output. Affected individuals often are anxious and apprehensive of facing social situations and managing day to day activities. Bacterial byproducts from the excessively colonized organisms can produce bad odor (bromhydrosis) and lead to social discomfort.[3,4] Individuals with primary hyperhidrosis tend to sweat from the skin surfaces and these subjects will be at distress and are ashamed to shake their hands with others.[5] Excessive dampness due to hyperhidrosis can render the skin susceptible to various fungal and bacterial infections. Hence, it is important to understand this condition and its complications for better management of the patients with this disorder

KEY WORDS

Hyperhidrosis, sweating, botulinum, Iontophoresis.

EPIDEMIOLOGY

The literature review indicates that the magnitude of primary hyperhidrosis ranges from 1% to 2.8% in general population.[6,7] Only 38% of individuals with symptoms of primary hyperhidrosis had sought consultancy with health care professionals, as observed in one of the American surveys. This disorder can present at any age, with the reported prevalence of 1.6% in teenagers. It is uncommon as the age advances, suggesting spontaneous regression.[8] Japanese tend to have higher prevalence of palmo-plantar hyperhidrosis (20 times more frequent) compared to other ethnic groups.[9] 49 out of 58 subjects had family history of hyperhidrosis in a European study, indicating that there can be influence of genetic mutation in some sub-ethnic groups.

Development of sweat glands probably influences axillary hyperhidrosis as the manifestations usually begin at puberty. The most common site of primary hyperhidrosis is axilla (73%), hands (45.9%) and feet (41.1%). The scalp region is fourth common site (22.8%), and least common region is groin (9.3%).[10] There is no significant gender difference reported in the literature.

CLASSIFICATION OF HYPERHIDROSIS

1. Primary hyperhidrosis (unidentifiable cause)
2. Secondary hyperhidrosis: with an underlying cause

Primary hyperhidrosis: the exact reason for excessive sweating is not clearly identifiable. However, increased sympathetic activity is suspected to be the possible underlying influencing factor. Autosomal dominant pattern of inheritance has been reported in certain ethnic group in palmo-plantar hyperhidrosis.

Secondary hyperhidrosis: Secondary hyperhidrosis can occur due to numerous conditions and several drugs have also been implicated.

Generalized hyperhidrosis

- Infective disorders: chronic infections, such as tuberculosis, malaria, brucellosis, HIV, bacterial endocarditis and few of the acute illnesses produced by viral or other bacterial infections can produce pathological sweating.

- Endocrine: Diabetes with dysautonomia, hypoglycemia, thyrotoxicosis, post-menopausal, pregnancy, Carcinoid syndrome, hyperpituitarism (acromegaly) & pheochromocytoma,
- Nervous system: Autonomic dysfunction, stroke, spinal cord injuries, extrapyramidal disorders like Parkinsonism, Riley-Day syndrome (familial dysautonomia) can be associated with excess sweating,
- Malignancies: Lymphoma and other myeloproliferative disorders,
- Medication induced excess sweating: Alcohol, cocaine, heroin, ciprofloxacin, acyclovir, omeprazole, antidepressants,
- Spontaneous periodic hypothermia and hyperhidrosis: This is postulated to be a rare cerebral neurotransmitter disorder,
- Others: congestive heart failure, anxiety, obesity & gout,

Localized hyperhidrosis: 1. Abnormal regeneration of sympathetic nerves 2. Peripheral neuropathy 3. Chronic alcoholism (Palmoplantar hyperhidrosis).

Emotionally induced hyperhidrosis: It is triggered by fear or anxiety. It mainly affects the palms, soles, and axillae.

PATHOPHYSIOLOGY

Pathophysiology is not clearly known in primary hyperhidrosis. Sweat glands can be of normal density but are found to produce excess sebum. Triggering factors like anxiety, stress, heat, exercise, tobacco, alcohol, and hot spices can contribute to primary hyperhidrosis.

Sweating is important in assisting thermoregulation, skin hydration and electrolyte balance. The sweat glands are of three types- eccrine, apocrine & apoeccrine glands, with variable distribution in various regions of the body. Eccrine glands are maximally located in palms and soles. Sweating from these glands is linked to emotional stimuli, which stops during sleep and controlled by cerebral cortex. Apoeccrine glands are responsible for hyperhidrosis in axillae. Sweating in face, scalp, chest and back are linked to heat stimuli and can persist throughout the day. Hypothalamus controls thermal sweating via thermosensitive pre-optic sweat centre. All the types of sweat glands are present in axillae; hence there can be odour and staining on cloths. Though the sweat glands are histologically normal, they respond abnormally to emotional stress.

CLINICAL PRESENTATION

Onset of Primary hyperhidrosis is common in childhood or adolescence & it can persist throughout life. Patients will have focal sweating most often in palms, soles & axillae and less often in scalp, face and groin. Environmental humidity and psychological stress can worsen primary hyperhidrosis. It is not considered as psychological disorder.

Patients note excessive sweating in affected areas. The most commonly affected sites are axillae, palms & soles, rarely other sites of the body are affected. Palmar hyperhidrosis can cause problems and fear of shaking hands, soiling of papers. Patients may have difficulty in performing tasks that require dry grip, these may result in social problems hyperhidrosis beginning later in life and generalized sweating & persisting during sleep should prompt a search for secondary causes.

Gustatory sweating: sweating around the nose, lips & forehead, commonly occurs after consumption of hot, spicy food. It can also be due to sympathetic nerve damage by diabetic neuropathy.

Chromhidrosis: Coloured sweat is an uncommon idiopathic non-hyperhidrotic condition. Apocrine glands secrete coloured sweat-yellow, blue, green or black. This can occur over face, axilla, groin or areola. The pigment is due to lipofuscin granules.

Night sweats: It is defined as drenching sweats that require changing bed cloths at night. Benign increased sweat due to overheated room or too many bed coverings needs to be ruled out. Common causes could be-malignancies like lymphoma, solid tumors like prostatic cancer, renal cell carcinoma & insulinoma. Common infections like tuberculosis, HIV, brucellosis & SBE are other possibilities in those with predominant night sweats.

Consensus criteria for diagnosing primary hyperhidrosis[11]

Focal, visible, excessive sweating of at least six months' duration without apparent cause with at least any two of the six characteristics:

1. Bilateral and relatively symmetrical
2. Impairs daily activities
3. At least one episode a week
4. Age of onset less than 25 years
5. Positive family history
6. Cessation of focal sweating during sleep.

Physical examination: Focal or generalized sweating is usually clearly notable. For direct visualization of the affected areas by hyperhidrosis, the iodine starch test may be used. This test requires spraying of the affected area with a mixture of 0.5-1 g of iodine crystals and 500 g of soluble starch. Areas that produce sweat turn black. Evidence of any diseases that can produce hyperhidrosis such as Thyrotoxicosis, malignancy, pheochromocytoma, tuberculosis etc must be looked for.

Hyperhidrosis is associated with increased incidence of other cutaneous disorders, common ones being dermatophytosis, pitted keratolysis and viral warts. Atopic eczematous dermatitis may have frequent association with hyperhidrosis.

Investigations: There is no standard definition for excessive sweating. Normal sweating can be considered as less than 1 ml/m^2 /min to the production of less than

100 mg of sweat in one axilla within 5 min, or less than 50 mg within 1 min.

Following investigations are done based on clinical clue

1. Thyroid function tests- to confirm hyperthyroidism,
2. Blood glucose levels- to confirm hypoglycemic episodes and diagnosis of diabetes mellitus (as diabetic dysautonomia can contribute to gustatory sweating),
3. Urinary metanephrine and vanillyl mandelic acid- to confirm pheochromocytoma,
4. Uric acid levels- to detect gout,
5. Tests to screen for infections such as tuberculosis, HIV, endocarditis and brucellosis,
6. Chest radiography and ultra-sound abdomen to evaluate tuberculosis or neoplasms.

Treatment of hyperhidrosis: Treatment of hyperhidrosis is not very rewarding in nearly 50% of the patients. However, satisfactory therapeutic response can be achieved in 40% of the patients. The selection of therapy depends on patient's acceptability and clinician's confidence. The investigations can give a clue to the underlying cause which may be treatable.

Certain general guidelines are to be given to all the subjects suffering from hyperhidrosis:[12]

1. Avoid alcohol & spicy food as much as possible.
2. Stress management- identify and manage emotional triggers.
3. Use antiperspirant sprays instead of deodorants.
4. Wear clothes made of natural fibers, which are not tight fitting.

First line therapy: the topical anti-perspirants are the most useful initial therapy for axillary hyperhidrosis. These are economical and easily available with least side-effects.

Anti-perspirants*:* Aluminium chloride preparations are the commonly used first line agents (topical antiperspirants) and have been found to be quite effective in trials.[13] The low dose metal salt preparations are used in the treatment of milder cases. Those with moderate to severe disease may require 20% aluminium chloride hexahydrate in ethanol or 6.25% aluminium chloride hexahydrate. Lifestyle modification and topical therapy for at least six weeks should be tried prior to switching over to other measures. Treatment with string anti-perspirants can produce skin irritation more so in the Axillary area which can be overcome by using low-potency corticosteroid creams.

Topical anticholinergics: They reduce perspiration by denaturing keratin and occluding the pores of the sweat glands. Commonly used agents are glycopyrrolate,[14,15] boric acid, 2-5% tannic acid solutions, resorcinol, potassium permanganate, glutaraldehyde, and methylamine. They need to be used more frequently as they are short acting. Disadvantages include staining, contact sensitization, irritancy, and limited effectiveness.

Iontophoresis*:* the principle is that, the charged ions are introduced into the skin by low intensity electrical current which inhibits the functions of the sweat glands.[16] It may also block the sweat glands temporarily. This is commonly done using tap water and anticholinergics, the latter being more effective. This technique merits consideration prior to systemic or aggressive surgical intervention and is more useful for palmo-plantar hyperhidrosis. More than 75% of patients notice a reduction in their symptoms within a month when iontophoresis is done on alternate days. The procedure is safe and simply but it can produce dry & cracked hands, skin erythema and transient vesiculation.

Botulinum toxin injections*:* Temporary reduction in sweat production occurs as the toxin blocks the release of acetylcholine at neuromuscular junctions. They are found to be effective for axillary hyperhidrosis.[17,18] Onabotulinum toxinA has been approved by US-FDA for axillary hyperhidrosis. The response to treatment is usually evident within two to four days and persists for four to nine months or longer. It is injected intradermally or subcutaneously using a 30 gauge needle. 10 to 20 injections spaced 1-2 cm apart are given in each axilla. This therapy is found o efficacious but expensive.

Microwave thermolysis: Microwave energy can be used to destroy eccrine glands and relieve hyperhidrosis in axilla. A commercial device design is available and approved by FDA. Microwave thermolysis is typically administered for 20 to 30 minute treatment sessions separated by three months. The overall reduction of sweat production by 50 to 75% has been observed by several studies.

Systemic agents: several agents have been tried for the treatment of primary hyperhidrosis but their potential adverse effects limit their usage. Commonly used agents are clonidine, glycopyrrolate, benztropine, oxybutynin. The common side effects include blurring of vision due to mydriasis, difficulty in defecation and micturition.

Surgical treatment: is the last resort considered when other measures have failed to give satisfactory outcome. Endoscopic thoracic sympathectomy, radiofrequency ablation, excision of the affected areas and subcutaneous liposuction are some of the modalities in use. Reports of operative success is more than 90%.[19] Sympathectomy involves the surgical destruction of the ganglia responsible for hyperhidrosis. The second (T2) and third (T3) thoracic ganglia are responsible for palmar hyperhidrosis, the fourth (T4) thoracic ganglia controls axillary hyperhidrosis, and the first (T1) thoracic ganglia controls facial hyperhidrosis. Endoscopic thoracic sympathectomy (ETS) procedure for upper extremity or cervicofacial involves the interruption of the upper sympathetic chain through cauterization, cutting, or clipping. The ideal patients for ETS, are young adults, BMI less than 28, absence of sweating during sleep, absence of significant co-morbidoities and resting heart rate of more than 55. ETS has been shown to give relief for variable

length of time in 66 to 95% of patients with upper limb hyperhidrosis. Excision of the affected area is particularly useful in axillary hyperhidrosis.[20]

Subcutaneous liposuction and curettage is another means of removing the eccrine sweat glands responsible for axillary hyperhidrosis. Compared with classic surgical excision, this modality results in less disruption to the overlying skin, resulting in smaller surgical scars and a diminished area of hair loss.

Sweat gland suction is a new surgical technique in which local anesthesia is applied and the sweat glands are carefully removed. This process is similar to liposuction.

COMPLICATIONS OF HYPERHIDROSIS

Common complications are: psycho-social disturbances, anxiety neurosis and depressive illness. There can be increased incidences of fungal and bacterial infections.

CONCLUSION

Although hyperhidrosis is difficult to treat, variety of treatment modalities are now available. Though the condition is not associated with mortality, it may adversely affect the patient's personal and professional life. Effective counseling, suppression of sweating by combination of treatment strategies can go a long way in giving effective relief to this challenging disorder.

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