

# Excessive Sweating: Are Patients Suffering Unnecessarily?

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## ABSTRACT

Primary axillary hyperhidrosis is a disorder characterized by excessive axillary sweating. An underdiagnosed and underreported issue, this disorder affects almost 8 million people in the United States. The condition often impacts an individual's occupation and emotional well-being and can even cause physical impairment. The purpose of this study is to educate primary care providers about the need for routine screening during annual physical exams, which will allow referral for appropriate treatment. We also describe options for management such as noninvasive, temporary topical solutions, oral medication, botulinum toxin A injections, surgery, and microwave energy.

**Keywords:** botulinum toxin, Botox, excessive sweating, hyperhidrosis, microwave device, miraDry

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Primary axillary hyperhidrosis is a disorder characterized by excessive sweating. It is an underdiagnosed and underreported condition that affects almost 8 million people in the United States,<sup>1</sup> with most of these individuals suffering in silence. This condition can impact the patient's occupation and emotional well-being, and may even cause physical impairment.<sup>2</sup> In addition to problems caused by excess sweating, the data suggest that the axillary odors associated with the stress response can negatively influence social interactions.<sup>3</sup> The purpose of this study is to help mitigate the adverse effects of primary axillary hyperhidrosis among affected individuals. This is accomplished by encouraging primary care providers to include routine screening for hyperhidrosis by employing a tool such as the Hyperhidrosis Disease Severity Scale in all annual physical exams and referring for treatment as needed.

Primary axillary hyperhidrosis is a chronic health condition, and education of health care providers on its management can positively influence the lives of those affected. Primary axillary hyperhidrosis is not often discussed between patients and health care providers, even though it can cause a significant disruption of an individual's life and emotional well-being. According to Strutton et al.,<sup>1</sup> only 38% of sufferers report discussing sweating with their health

care professional, although women are more apt to discuss it than men (47.5% vs. 28.6%, respectively). It is unclear why more people who experience excessive sweating do not discuss it with their provider. Most likely, the embarrassing nature of the disorder has an effect on patients' willingness to initiate the conversation, or they are unaware it is a condition with available treatment. There are a number of available options for management, however, ranging from noninvasive temporary solutions to a permanent cure. Therefore, education of both health care providers and patients is necessary to allow sufferers to lead normal lives.

## BACKGROUND

The regulation of body temperature is vital for survival. Body core temperatures of  $> 40^{\circ}\text{C}$  result in protein denaturation and cell death, which, over an extended period, can lead to multiorgan failure.<sup>4</sup> The body contains over 4 million sweat glands to maintain thermal regulation. There are 3 different types of sweat glands in the skin of a normal human axilla: apocrine, eccrine, and apo-eccrine, and all are active in primary axillary hyperhidrosis.

Apocrine glands, present at birth, become active at puberty. They are restricted only to hairy regions of the body and found in the axilla, breast, vermilion

border of the lip, the perineum, and the face, but never the hands.<sup>4</sup> Apocrine sweat secretes directly into the hair follicle instead of the skin in small volumes as a viscid, cloudy white liquid. After maximum secretion, there is a delay of 1-2 days before producing more apocrine sweat. The apocrine sweat is believed to be important for body odor and pheromones.<sup>5</sup> Innervation of apocrine glands is not well understood and is equally responsive to both adrenergic and cholinergic stimuli, but slightly more responsive to adrenaline than noradrenaline. This phenomenon suggests hormones from the adrenal gland may be more significant than adrenergic stimulation from nerve terminals in the area of the apocrine gland.<sup>5</sup>

Eccrine sweat glands are active at birth and distributed over most of the body surface, excluding the external auditory canal, lips, and portions of the genitals. Eccrine glands are the only sweat glands found in the hands. They secrete a continuous production of a watery substance directly to the skin surface. The amount fluctuates depending on environmental stimuli and the individual. Their primary function is to assist in maintaining the body's temperature response to heat exposure, exercise, and emotional stress. Eccrine glands, located in the deep dermal layer of the skin, are innervated by post-ganglionic sympathetic nerve fibers and are stimulated by the neurotransmitter acetylcholine.<sup>6</sup>

Apo-eccrine glands evolve from eccrine glands and constitute nearly half of all axillary glands by age the age of 18 years. Apo-eccrine glands produce a copious watery secretion very similar to eccrine sweat. Apo-eccrine glands respond to both adrenergic and cholinergic stimuli, but are more sensitive to cholinergic stimuli, more so than apocrine or eccrine glands.<sup>6</sup>

### **ETIOLOGY AND RISK FACTORS OF AXILLARY HYPERHIDROSIS**

Primary axillary hyperhidrosis is excessive sweating in the axilla not caused by a medical condition or medications.<sup>1</sup> Although not well understood, it is considered to be the result of an overactive autonomic nervous system.<sup>6</sup> In primary axillary hyperhidrosis, it is argued that eccrine sweat glands receive abnormal stimulation by sympathetic fibers causing excessive

sweat production.<sup>7</sup> The histology, size, count, gland density, and function of acetylcholinesterase, however, is normal in these patients.<sup>8</sup> The fact that many patients suffering from primary axillary hyperhidrosis also suffer from palmar hyperhidrosis; as the palms only contain eccrine glands, supports the abnormal eccrine gland stimulation theory.<sup>9</sup>

Apocrine, and apo-eccrine glands may also play a role in primary axillary hyperhidrosis. For example, axillary osmidrosis, or excessive body odor, is a secondary issue that may be experienced by individuals who suffer from primary axillary hyperhidrosis.<sup>10</sup> The peak age of onset for axillary hyperhidrosis is 15-18 years. This age correlates with the time at which apocrine and apo-eccrine glands become active. It also correlates with the time at which eccrine gland density is at its lowest as they evolve into apo-eccrine glands.<sup>8</sup> In addition, when starch-iodine methods are used to outline axillary sweating, hair-bearing areas show the highest concentration of sweat. This finding is consistent with apocrine or apo-eccrine distribution rather than eccrine because the axilla vault corresponds to the area of greatest apocrine gland density. Furthermore, the apo-eccrine gland is active around the time of puberty and confined to the hair-bearing areas of the axilla. It is also capable of secreting 7 times more sweat than the eccrine gland and is more responsive to cholinergic stimulation than the eccrine gland.<sup>5</sup>

### **SEVERITY OF PRIMARY AXILLARY HYPERHIDROSIS AS A HEALTH PROBLEM**

As mentioned, primary axillary hyperhidrosis affects almost 3% of the population in the United States.<sup>1</sup> Primary axillary hyperhidrosis adversely affects the afflicted individual's ability to perform in the workplace, be comfortable in public, meet people, and develop personal relationships.<sup>11</sup> Many patients report changing their clothing several times per day and editing colors they choose to wear. Individuals say light or bright colors such as light gray or khaki show sweat badly, and they do not wear them. Silks and satins show sweat more readily, and sufferers of hyperhidrosis avoid these fabrics as well.

Emotional sweating is a physical reaction to stimuli such as stress, anxiety, fear, and pain. This sweating can manifest over the entire body, but tends

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