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Excessive Sweating in the Paediatric Population: A Comprehensive Review

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Abstract: Excessive sweating, or hyperhidrosis, in children is a significant but frequently under-recognised condition that affects thermoregulation, physical comfort, daily functioning, and psychosocial well-being. Paediatric hyperhidrosis may be primary or secondary to underlying medical, endocrine, metabolic, neurological, infective, or psychological disorders. Early identification is essential, as untreated hyperhidrosis can interfere with academic performance, social interactions, and emotional development. This review examines the epidemiology, classification, aetiology, pathophysiology, clinical features, diagnostic evaluation, investigations, differential diagnosis, management strategies, and long-term outcomes associated with excessive sweating in children. A comprehensive diagnostic algorithm has been included to help clinicians differentiate between primary and secondary hyperhidrosis. Management options, including lifestyle measures, topical agents, systemic therapies, botulinum toxin injections, and surgical interventions, are discussed, along with the importance of counselling, parental guidance, and psychological support. This review aims to provide clinicians and researchers with a complete, evidence-based resource for optimising paediatric hyperhidrosis care.

Keywords: *Hyperhidrosis, Excessive Sweating, Paediatrics, Primary Hyperhidrosis, Secondary Hyperhidrosis, Sympathetic Over Activity, Diagnostic Algorithm, Management.*

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I. INTRODUCTION

Sweating is a vital physiological mechanism controlled by the autonomic nervous system to maintain thermoregulation. However, when sweating exceeds normal physiological requirements, it becomes clinically significant and is termed hyperhidrosis. In children, excessive sweating is frequently overlooked due to parental misconceptions, normalisation of symptoms, or lack of awareness among caregivers. Paediatric hyperhidrosis may present as primary focal hyperhidrosis, which commonly has no identifiable cause and begins in childhood or adolescence, or as secondary hyperhidrosis, which is associated with systemic illnesses or medication use.

The condition affects an estimated 1–3% of children, although the true prevalence may be higher due to underreporting. Hyperhidrosis impacts multiple aspects of a child's life, including handwriting, physical activity, peer interactions, and emotional confidence. When left untreated, it may contribute to anxiety, social withdrawal, and interruptions in routine activities. Early diagnosis and appropriate management can significantly improve quality of life, making awareness and proper evaluation crucial for clinicians.

II. CLASSIFICATION OF HYPERHIDROSIS

Hyperhidrosis in children can be broadly classified into primary and secondary types. Primary hyperhidrosis often presents as focal and symmetrical sweating involving the palms, soles, axillae, or face, frequently triggered by emotional stimuli such as anxiety, stress, or heat exposure. Its onset usually occurs during late childhood or adolescence, and many children have a positive family history, indicating a possible genetic predisposition.

In contrast, secondary hyperhidrosis may be generalised or focal and often occurs during sleep as well. It results from underlying systemic illnesses, endocrine disorders, metabolic abnormalities, infections, neurological conditions, malignancies, or medication side effects. Identifying secondary causes is critical as they require targeted investigation and specific treatment.

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III. ETIOLOGY

Primary hyperhidrosis is believed to result from idiopathic overactivity of the sympathetic nervous system, particularly involving the cholinergic fibres that stimulate sweat glands. Although the exact mechanism remains unclear, genetic and autonomic factors play significant roles. Emotional and environmental triggers commonly exacerbate symptoms.

Secondary hyperhidrosis has a far more diverse range of causes. Endocrine disorders such as hyperthyroidism, hypoglycaemia in diabetes mellitus, pheochromocytoma, and hormonal fluctuations during puberty may precipitate excessive sweating. Infective causes include tuberculosis, malaria, dengue, HIV, and other chronic infections, which often present with fever and night sweats. Metabolic abnormalities such as obesity, rickets, mitochondrial disorders, and metabolic acidosis may also contribute. Neurological conditions, including autonomic neuropathy and spinal lesions, cardiac diseases such as congenital cyanotic heart diseases, and respiratory conditions including sleep apnoea and pneumonia, have all been associated with excessive sweating. Malignancies like lymphoma, leukaemia, and neuroblastoma are critical to consider when symptoms are accompanied by red flags. Certain medications including SSRIs, steroids, antihypertensives, opioids, and antipyretics may induce sweating as a side effect. Psychological factors such as stress, anxiety, and panic episodes also contribute significantly, especially in adolescents.

IV. PATHOPHYSIOLOGY

Sweating is regulated by the sympathetic nervous system through cholinergic signalling to eccrine sweat glands. In primary hyperhidrosis, excessive sweating occurs due to heightened sympathetic output without any structural abnormality of the glands themselves. Increased acetylcholine release and exaggerated responses to emotional stimuli have been implicated. Secondary hyperhidrosis, however, develops as a consequence of systemic disease, fever, increased metabolic demand, or endocrine dysregulation, stimulating thermoregulatory centres or altering autonomic thresholds.

V. CLINICAL FEATURES

Children with hyperhidrosis often present with excessive perspiration that interferes with normal activities. Palmar sweating may cause difficulty holding pencils, slipping when gripping objects, and smudging written work. Axillary sweating leads to staining and odour concerns, contributing to embarrassment. Plantar sweating can result in slippery footwear and increased risk of falls. Craniofacial sweating may be visible even with minimal physical exertion.

Psychosocial effects are substantial. Many affected children experience low self-esteem, avoid social interactions, or withdraw from activities that involve physical contact. Participation in sports may be limited due to discomfort or embarrassment. Recurrent skin infections, such as fungal involvement of the feet or intertrigo, can further complicate the condition.

Red-flag symptoms such as night sweats, weight loss, pallor, fever, bone pain, lymphadenopathy, and respiratory distress warrant urgent evaluation for secondary causes, including infections and malignancies.

VI. DIAGNOSTIC APPROACH

A thorough history is essential to differentiate primary from secondary hyperhidrosis. Clinicians should assess the onset, duration, pattern, triggers, and severity of sweating, along with any associated symptoms such as fever, palpitations, or weight changes. Family history, medication use, psychological stressors, and environmental factors must be explored.

Physical examination should include assessment of vital signs, growth parameters, thyroid gland, lymph nodes, cardiovascular and respiratory systems, neurological status, and a complete skin examination to identify fungal infections or irritant dermatitis.

When features suggest secondary hyperhidrosis such as generalised sweating, night sweats, or red-flag symptoms appropriate investigations must be performed. Figure 1 provides a systematic diagnostic algorithm to guide clinical decision-making.

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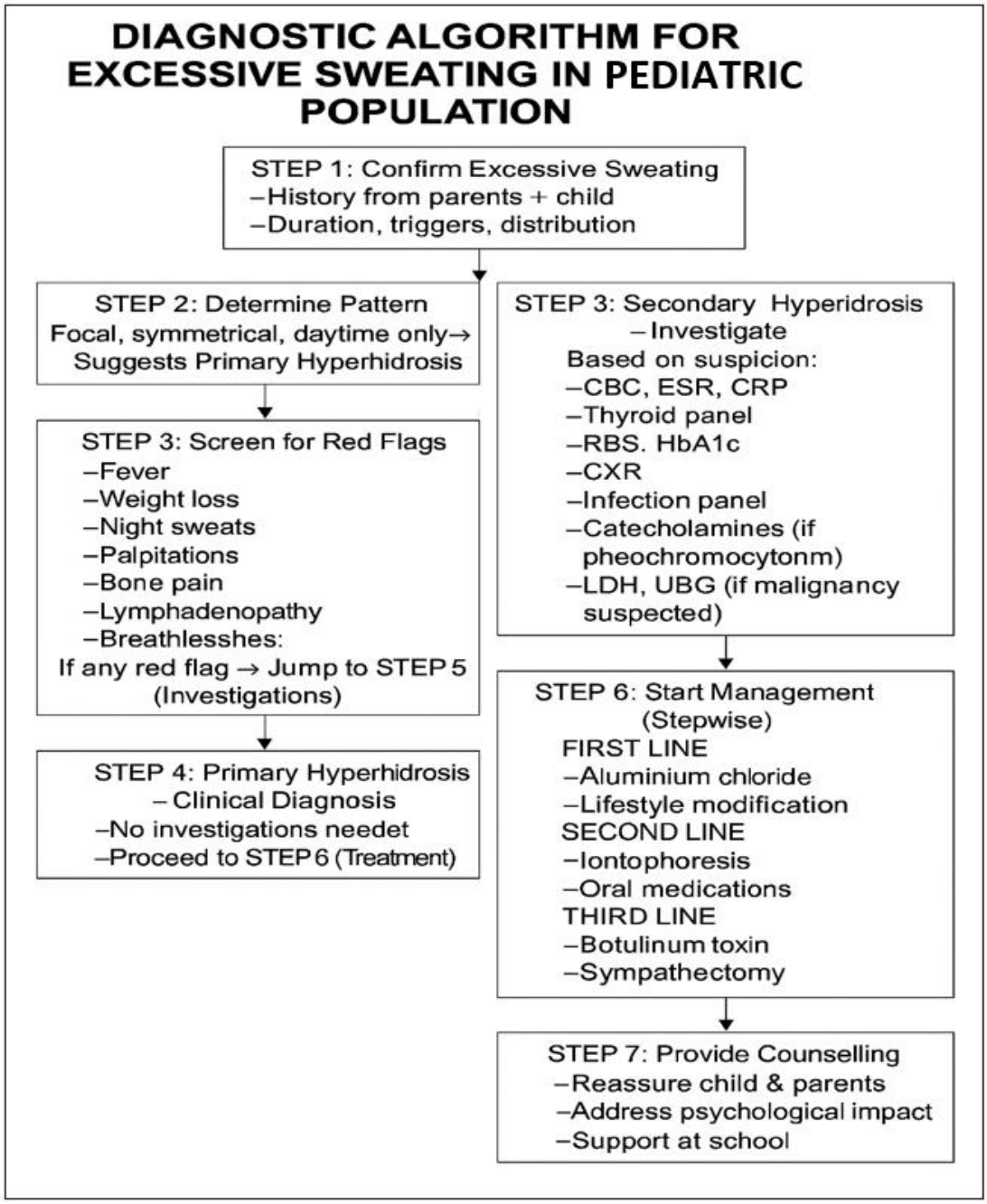

Fig 1: Diagnostic Algorithm for Excessive Sweating in the Paediatric Population

VII. INVESTIGATIONS

Most children with primary hyperhidrosis require minimal investigation beyond clinical evaluation. However, secondary hyperhidrosis necessitates targeted testing depending on clinical suspicion. Basic laboratory studies include CBC, ESR, CRP, thyroid function tests, RBS, HbA1c, and urinalysis. Infective causes require specific markers such as chest X-ray, Mantoux or IGRA tests, malaria smears, dengue serology, and blood cultures when indicated. Endocrine evaluations may include cortisol levels and catecholamine analysis for suspected pheochromocytoma. MRI and nerve conduction studies are useful when neurological involvement is suspected. Imaging such as abdominal ultrasound or CT/MRI is important when malignancy is considered.

VIII. DIFFERENTIAL DIAGNOSIS

The differential diagnosis of paediatric hyperhidrosis is broad and includes primary focal hyperhidrosis, endocrine disorders like hyperthyroidism and hypoglycaemia, catecholamine-secreting tumours, chronic infections, cardiac failure, obesity-related sweating, autonomic neuropathy, psychological conditions, and malignancies such as lymphoma and leukaemia. Distinguishing among these conditions requires careful history, examination, and targeted investigations.

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IX. MANAGEMENT

Management requires a structured, stepwise approach. Initial strategies involve treating underlying causes in cases of secondary hyperhidrosis and providing reassurance and education to the child and family. Lifestyle modifications, including wearing breathable clothing, maintaining good hygiene, avoiding known triggers, and using absorbent powders or moisture-wicking socks, can significantly reduce symptoms.

Topical aluminium chloride hexahydrate is the preferred first-line therapy for focal hyperhidrosis. Iontophoresis is effective for palmar and plantar sweating and is safe in older children. Oral anticholinergics such as glycopyrrolate and oxybutynin can be considered in more severe cases but require monitoring for side effects. Botulinum toxin A injections provide temporary relief for axillary, palmar, and plantar sweating but may require anaesthesia in children due to discomfort. Surgical interventions, such as endoscopic thoracic sympathectomy, are reserved for severe, resistant primary hyperhidrosis due to the risk of compensatory sweating.

X. COUNSELLING AND PSYCHOLOGICAL SUPPORT

Counselling is an integral part of management. Parents should be reassured that hyperhidrosis is a medical condition unrelated to hygiene. Children and adolescents benefit from guidance addressing body image, social anxiety, and academic challenges. Teachers should be informed about the child's condition to make appropriate accommodations, such as allowing frequent wiping of hands or bathroom breaks. Psychological interventions may be helpful in cases complicated by anxiety disorders.

XI. PROGNOSIS

Primary hyperhidrosis tends to persist into adulthood, although severity may fluctuate. With appropriate therapy, most children experience significant improvement. The prognosis of secondary hyperhidrosis depends entirely on the underlying cause. Timely diagnosis and management improve physical comfort and psychosocial well-being.

XII. DISCUSSION

Paediatric hyperhidrosis is a multifaceted condition requiring comprehensive assessment and personalised management. Differentiating between primary and secondary causes is crucial. Despite its common impact, hyperhidrosis remains underdiagnosed, partly due to limited awareness among caregivers. Psychosocial implications are often profound, highlighting the importance of empathy and mental health support. Emerging therapies, including microwave thermolysis and laser-based treatments, show potential benefits but require further paediatric-focused research. A multidisciplinary approach involving paediatricians, dermatologists, and psychologists ensures optimal outcomes.

XIII. CONCLUSION

Excessive sweating in children is a clinically important condition that warrants timely recognition and systematic evaluation. Differentiating primary from secondary hyperhidrosis is essential for proper management. A structured diagnostic and therapeutic approach, combined with psychosocial support, enhances the child's overall quality of life. Continued research is necessary to improve understanding and expand treatment options in paediatric hyperhidrosis.

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