

Primary enuresis and comorbid sleepwalking in an adolescent: Diagnostic and therapeutic challenges, a case report from rural Nepal

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ABSTRACT

Primary nocturnal enuresis (PNE) and somnambulism are categorized as arousal disorders resulting from non-rapid eye movement (NREM) sleep. These diseases have a shared neurophysiological basis: poor arousal from slow-wave sleep. We report a case of a 10-year and 11-month-old male who presented to a tertiary care hospital in Karnali Academy of Health Sciences, Jumla, Nepal, with persistent enuresis and concurrent sleepwalking. Further, evaluation indicated a 2 to 3-year history of intermittent somnambulism. This instance emphasizes the importance of viewing enuresis as part of a broader context of arousal disorders rather than as a standalone urological issue. It also emphasizes the difficulties of handling such situations in resource-constrained environments, as well as the importance of integrating behavioral and neurophysiological techniques. The initial pharmacological therapy with imipramine (25 mg at bedtime) produced a response to symptom frequency.

Keywords: Arousal disorders, Bedwetting, Imipramine, NREM sleep, Parasomnias, Primary nocturnal enuresis, Slow-wave sleep

INTRODUCTION

Primary nocturnal enuresis (PNE) is defined as involuntary urination during sleep in children aged five years and above who have never had prolonged overnight dryness.¹ Enuresis (Code: 6C70) is classified as an Elimination Disorder in the International Classification of Diseases 11th Revision (ICD-11), with the principal subtype identified when dryness has never been confirmed.² It reflects elimination problems whose frequency declines with age but persists throughout adolescence in a specific group of people.^{1,3} Global estimates show a prevalence rate of around 15% at age 5, 5-10% at age 10 and 1-3% among teenagers and young adults.⁴ Traditionally thought of as a bladder function issue or delayed maturation, current research increasingly supports a more integrated model that includes sleep neurophysiology, arousal processes, and central nervous system control.^{5,6} Somnambulism a form of non-rapid eye movement (NREM) parasomnia is defined as complicated motor actions that emerge from deep sleep, generally during Stage N3 (slow-wave sleep).^{3,7} According to the ICD-11, Sleepwalking (Code: 7A40.0) is a disease characterized by inadequate waking from sleep.⁸ While sleepwalking is most frequent in childhood with a lifetime frequency of up to 17% and a peak incidence between the ages of 8 and 12 it continues into adulthood in around 2-4% of the population.⁸

Similar to enuresis it is a condition of incomplete arousal in which the brain fails to reach full alertness despite activation of motor or autonomic systems.⁹ This dissociation leads to activities occurring outside conscious awareness, with subsequent forgetfulness of the incident.

PNE and somnambulism are increasingly believed to be part of a

larger spectrum of NREM arousal disorders known as a deep sleep phenotype.^{1,2} This phenotype is characterized by increased slow-wave sleep intensity, elevated arousal thresholds, reduced reactivity to internal cues (e.g., bladder distention), and instability in sleep-wake transitions. Neurobiologically, these conditions are considered to involve the dysregulation of thalamocortical networks and brainstem arousal systems, resulting in a lack of coordinated cortical activity.⁶ Enuresis emerges as an inability to awaken in reaction to bladder fullness, but somnambulism allows for partial arousal and motor output without conscious control.

The presence of enuresis and somnambulism in the same person is clinically noteworthy because it indicates a broader failure of arousal control rather than an isolated organ-specific illness.^{9,10} Children with enuresis had a higher proportion of parasomnias, supporting the notion of common underlying processes related to sleep architecture and arousal thresholds.^{10,11}

This overlap has significant clinical consequences. Management techniques focusing exclusively on bladder function may be inadequate in such instances, necessitating approaches that address sleep structure and arousal conditioning.^{6,12} This is especially important in tertiary care settings such as the Karnali Academy of Health Sciences (KAHS), where access to specialized sleep diagnostics (e.g., polysomnography) and routine therapies, such as enuresis alarms, may be limited. In such cases, doctors must depend on meticulous clinical characterization and pragmatic physiology-based therapies.

In this report, we present a 10-year and 11-month-old male with persistent primary nocturnal enuresis and comorbid somnambulism. The clinical course highlights the limitations of conventional treatment and emphasizes the importance of conceptualizing these conditions within a unified framework of arousal disorders.

CASE PRESENTATION

A 10-year and 11-month-old male presented to the Karnali Academy of Health Sciences, Jumla, psychiatry outpatient department with a history of involuntary passage of urine while sleeping. The enuretic episodes had been prevalent since early childhood, with no prolonged periods of dryness each night, indicating primary nocturnal enuresis. At the time of presentation, the episodes were observed to occur 1-2 times every

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night. The episodes occurred primarily during nocturnal sleep but were also recorded during daytime naps, suggesting a probable link to sleep state rather than to circadian timing alone.

Prior to seeking clinical advice, the family had previously sought advice from local religious healers on several occasions. These healers assured the family that the problem would resolve on its own when the child got older. Based on this advice, the family waited several years for a natural resolution, but the symptoms remained and occurred daily. The persistent nature of the problem despite these traditional therapies finally led to severe mental stress for both the patient and family members, necessitating a visit to the tertiary care institution. A detailed developmental history demonstrated that milestones in the motor, language, and social domains occurred normally. There was no indication of neurodevelopmental abnormalities, intellectual impairment, or behavioral dysregulation. The family history was non-contributory with no first-degree relatives reporting enuresis, parasomnias, or other mental diseases. The child was described as having normal scholastic achievement and adequate peer interactions with no signs of academic deterioration or social disengagement.

Further inquiry into the sleep history indicated the existence of a concomitant parasomnia. The patient had been suffering from sleepwalking (somnambulism) for the previous 2-3 years. These events happened infrequently, roughly once per 1-2 months, and were often reported around 3:00 a.m. During these occasions, the patient would demonstrate complex motor actions, such as moving around the house and engaging in purposeless activities while remaining apparently unresponsive. The symptoms of these episodes were compatible with NREM parasomnia. When he awoke, he had no awareness of what had happened. There were no nocturnal seizure-related characteristics, such as tonic-clonic movements, tongue biting, or postictal disorientation, and no history of REM sleep behavior disorder. The episodes were not caused by acute stress; however, periodic sleep deprivation was observed to enhance their risk.

Additional history indicated regular bowel habits with no signs of constipation or encopresis, ruling out bowel dysfunction as a contributory reason. No concomitant psychiatric problems were identified. The patient did not show signs of anxiety disorders, mood disorders, attention deficit/hyperactivity disorder, or psychosis. Emotional and behavioral functioning was reported to be steady, with no substantial psychosocial stressors detected in the family or school context.

On clinical examination, the patient appeared well-nourished and cooperative, with no signs of discomfort. The neurological examination revealed that higher mental processes were intact, tone and reflexes were normal, and there were no focal impairments. The systemic examination, including abdominal and genitourinary assessments, was unremarkable. There were no clinical symptoms indicating spinal dysraphism, urinary tract disease, or endocrine problems.

To exclude the secondary causes of enuresis, a thorough series of examinations was completed. All laboratory indicators, including the complete blood count, renal function tests, liver function tests, thyroid function tests, and serum vitamin B12 levels, were normal. Ultrasound imaging of the abdomen and pelvis indicated no urinary tract structural abnormalities, including normal bladder morphology and the lack of post-void residual urine. These data clearly ruled out organic, metabolic, and structural etiologies, confirming the diagnosis of primary nocturnal enuresis with a functional and neurophysiological basis.

Following evaluation, the patient was put on a pharmaceutical and behavioral care regimen. The pharmacotherapy consists of a Tab. Imipramine 25 mg at bedtime. Concurrent behavioral therapies included limiting fluid intake in the evening, improving sleep hygiene, and discontinuing daytime naps, all of which aimed to reduce nocturnal urine output and modulate sleep architecture. The family was advised to stick to the treatment plan and monitor their symptoms. Following adherence to both pharmaceutical and behavioral measures, the patient's symptoms improved significantly. The clinical picture suggests primary nocturnal enuresis happening within the context of a larger disorder of arousal from NREM sleep as demonstrated by the presence of somnambulism and the temporal patterning of nocturnal episodes.

DISCUSSION

This case is a clinically significant example of the link between primary nocturnal enuresis and somnambulism, illustrating the broader concept of arousal disorders during NREM sleep. The patient presentation, which includes lifetime symptoms and a lack of responsiveness to conventional beliefs, suggests a central abnormality in arousal control rather than a solely peripheral or urinary origin.

An elevated arousal threshold during slow-wave sleep (Stage N3) is a common trait between enuresis and somnambulism. Under normal conditions physiological triggers such as bladder distention activate ascending arousal circuits resulting in wakefulness and voluntary voiding.^{3, 4} However, in this 10-year-old child this signaling route was disrupted resulting in involuntary urination 1-2 times each night despite a physiological need to wake.¹⁰ Similarly, the patient's somnambulism is a form of partial arousal in which subcortical motor systems are engaged but higher cortical regions are inhibited.^{5, 11} The coexistence of these abnormalities strongly supports the concept of a common malfunction in sleep-wake transition processes which is most likely caused by thalamocortical dysregulation and altered homeostatic sleep pressure.^{4, 6} The enuretic episodes occurred mostly during nocturnal sleep and even during daytime naps indicating that the illness is related to the sleep state rather than a circadian clock. Furthermore, the observed time of somnambulism around 3:00 a.m. is consistent with the distribution of slow-wave sleep (Stage N3) cycles.^{8, 12} This temporal grouping strongly suggests that these episodes are physiologically tied to the NREM sleep architecture rather than independent random occurrences. The history of seeking help from several local religious healers is an important component of this case. The healer's recommendation that the symptoms would resolve naturally caused the family to wait for years while the patient experienced 1-2 bouts every night. This demonstrates the powerful influence of traditional belief systems on the duration of untreated illness in rural Nepal. Such delays not only prolong the child's psychosocial anguish, but they also enable the neurophysiological patterns of reduced arousal to become more firmly established before seeking medical attention.

This patient's somnambulism for the last 2-3 years is diagnostically noteworthy. It shows that NREM sleep is inherently unstable and prone to incomplete arousals.^{7, 11} According to earlier research, the high prevalence of parasomnias among children with enuresis suggests a common pathophysiological substrate.^{7, 8} In this situation, enuresis is the visceral expression of an arousal issue, whereas sleepwalking is the behavioral equivalent. The patient's quick but brief reaction to 25 mg of imipramine highlights the difficulties of depending only on medication. Management must be pragmatic at institutions like the KAHS, where modern diagnostics such as polysomnography and enuresis alarms are not accessible. The goal for multimodal treatments is to regulate sleep architecture through behavioral entrainment (timed waking) and sleep hygiene.^{4, 13} Most significantly, this example demonstrates that care must include thorough family education to combat misinformation from faith healers and reduce the stigma that often leads to delayed presentation.^{7, 14} This instance highlights numerous critical aspects for clinical practice. Evaluate enuresis using a sleep medicine framework, especially if it occurs during daytime naps. Actively test for comorbid parasomnias, which indicate a deep sleep phenotype. Addressing socio-cultural and traditional healing practices is crucial for prompt medical intervention and adherence. Family education is crucial in shifting the mindset from viewing it as a curse or a phase to recognizing it as a curable neurological illness.

CONCLUSION

The presence of primary nocturnal enuresis and somnambulism in this patient demonstrates a connected disease of poor awakening from slow wave sleep. It emphasizes the importance of moving away from bladder-centric therapies and toward a broader sleep medicine approach, especially when enuresis is accompanied by additional NREM parasomnias. In resource-constrained environments such as the Karnali region where modern diagnostics are sparse, a thorough clinical history remains the most important diagnostic tool. Finally,

incorporating sleep hygiene and caregiver education into management is critical for maximizing therapeutic effectiveness and psychosocial outcomes in pediatric populations.

DECLARATIONS

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None

Author Contributions

AKS was responsible for the research concept, design, and literature search. RS, NR, and JB contributed to data collection, data analysis, and data interpretation, with JB also involved in the design and literature search. AKS, RS, and JB contributed to drafting the manuscript, while AKS, RS, NR, and JB were involved in reviewing the manuscript for important intellectual content. AKS, RS, NR, and JB gave final approval of the version ready for submission and agreed to be accountable for all aspects of the work. JB was also responsible for correspondence with the journal.

Ethical Approval

Not Applicable.

Consent/Assent

Informed written consent was obtained from the patients parent.

Name of Registry and Registration number

Not applicable

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest

One of the author of the article is the editorial team of the journal, he was not involved in any of the editorial process of the article.

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