Section: Paediatrics

Original Research Article

NOCTURNAL ENURESIS AND ITS MANAGEMENT: AN OVERVIEW

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Received : 09/01/2025
Received in revised form : 05/03/2025
Accepted : 21/03/2025

Keywords:
Nocturnal Enuresis; Behavioural Therapy; Alarm Therapy.

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DOI: 10.47009/jamp.2025.7.3.9

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (3); 42-46

ABSTRACT

Background: Nocturnal enuresis, or bedwetting, is a common condition affecting children and adolescents, often impacting their psychological well-being. It is classified into primary nocturnal enuresis (PNE) and secondary nocturnal enuresis (SNE), with multiple contributing factors, including genetic predisposition, bladder dysfunction, delayed central nervous system maturation, and hormonal imbalances. This study evaluates the effectiveness of behavioral therapy, alarm therapy, and pharmacotherapy in managing nocturnal enuresis. **Materials and Methods:** A prospective observational study was conducted on 50 children (6–15 years) diagnosed with nocturnal enuresis. Participants were divided into three treatment groups: Behavioral Therapy Group (BTG), Alarm Therapy Group (ATG), and Pharmacotherapy Group (PTG). The frequency of enuresis episodes was recorded at baseline and after three months. Statistical analysis was performed using a paired t-test ($p < 0.05$ for significance). **Result:** The study revealed a significant reduction in enuresis episodes across all groups. Pharmacotherapy was the most effective ($p = 0.002$), followed by alarm therapy ($p = 0.008$) and behavioral therapy ($p = 0.032$). Complete resolution occurred in 60% of the pharmacotherapy group, 40% of the alarm therapy group, and 20% of the behavioral therapy group. The highest relapse rate (25%) was observed in the pharmacotherapy group, while combined therapy had the lowest (10%). **Conclusion:** Pharmacotherapy provides the fastest and most effective relief but has a higher relapse rate post-treatment. Alarm therapy offers a long-term solution with better sustained results. Behavioral therapy alone is less effective but beneficial when combined with other methods. A multimodal approach integrating these strategies ensures optimal outcomes, reducing relapse rates and improving the quality of life for affected children.

INTRODUCTION

Nocturnal enuresis, commonly referred to as bedwetting, is a condition characterized by the involuntary passage of urine during sleep in individuals who are typically expected to have achieved bladder control. It is a prevalent issue, particularly among children, and can persist into adolescence and adulthood in some cases. Nocturnal enuresis is generally classified into two types: primary nocturnal enuresis, where the individual has never achieved consistent nighttime dryness, and secondary nocturnal enuresis, where bedwetting occurs after a period of at least six months of dryness.[1] While the condition is often considered a normal part of childhood development, it can have significant psychological, social, and emotional impacts on affected individuals and their families.

The etiology of nocturnal enuresis is multifactorial, involving a complex interplay of genetic, physiological, and behavioral factors. Genetic predisposition plays a significant role, as children with a family history of bedwetting are more likely to experience the condition. Physiologically, nocturnal enuresis is often associated with delayed maturation of the central nervous system, leading to reduced arousal responses to a full bladder during sleep. Additionally, abnormalities in antidiuretic hormone (ADH) secretion, which regulates urine production at night, and bladder dysfunction, such as reduced bladder capacity or overactivity, are commonly implicated. Psychological factors, including stress, anxiety, and major life changes, can also contribute to secondary nocturnal enuresis. Due to the stigma associated with bedwetting, children who have enuresis frequently experience social isolation and low self-esteem. Due to the negative effects of

ISSN (O): 2687-5365; ISSN (P): 2753-6556

psychological stress and irregular sleep patterns, this condition can also impair academic performance.[2-4] Five percent of people had noticeable nocturnal enuresis (at least once a week), and one percent had noticeable day wetting.[5] According to Srinath et al,[6] Indian children aged 0–16 had lower prevalence rates of psychiatric morbidity than those in the West. In a study by Foxman et al,[7] 14% reported enuresis at least once in a 3-month period among the general population of children. Compared to girls, boys were much more likely to suffer from enuresis.

The management of nocturnal enuresis requires a comprehensive and individualized approach, considering the underlying causes, the severity of the condition, and the impact on the patient's quality of life. Behavioral interventions are often the first line of treatment and include strategies such as bladder training, fluid restriction before bedtime, and the use of bedwetting alarms. Bedwetting alarms, which alert the individual upon detecting moisture, are particularly effective in conditioning the brain to respond to a full bladder during sleep. Pharmacological treatments, such as desmopressin (a synthetic analog of ADH) and anticholinergic medications, may be prescribed in cases where behavioral interventions are insufficient.[1] Desmopressin reduces nighttime urine production, while anticholinergics help manage bladder overactivity. In cases where psychological factors are prominent, counseling or therapy may be recommended to address underlying stressors or emotional challenges.

MATERIALS AND METHODS

Study Design: A prospective observational study was conducted on children diagnosed with nocturnal enuresis, aged between 6 and 15 years. The study spanned six months, with follow-up at baseline and after three months of treatment.

Sample size: 50 children

Inclusion Criteria

- Children aged 6–15 years with primary or secondary nocturnal enuresis.
- No underlying structural or neurological abnormalities.
- Parents willing to participate in the study.

Exclusion Criteria

- Children with urinary tract infections, diabetes mellitus, or neurogenic bladder.
- Children with psychiatric disorders affecting urinary control.

Methods for Assessment - Baseline Assessment:

At the start of the study, baseline demographic details, frequency of enuresis episodes, family history, and psychological impact were recorded. The children were divided into three treatment groups:

- Behavioral therapy group (BTG) – Motivational therapy, bladder training, fluid restriction before bedtime.
- Alarm therapy group (ATG) – Use of enuresis alarms to condition arousal.
- Pharmacotherapy group (PTG) – Desmopressin and/or anticholinergic medication.

Statistical Analysis: All statistical analyses were conducted using SPSS software. The frequency of enuresis episodes per week was recorded before treatment and after three months. A paired t-test was used to analyze treatment efficacy, with significance set at $p < 0.05$.

Follow-up: Children were followed up at the end of three months to assess treatment response. The response was categorized as:

- Complete Response: ≥90% reduction in episodes.
- Partial Response: 50–89% reduction in episodes.
- No Response: <50% reduction in episodes.

Ethical Considerations: Ethical approval was obtained from the institutional ethics committee prior to the study. Informed consent was taken from the parents or guardians of all participants, ensuring confidentiality and voluntary participation.

RESULTS

The study included 50 children with a mean age of 9.5 ± 2.3 years. Males were more commonly affected (32 boys vs. 18 girls). A positive family history of nocturnal enuresis was seen in 40% of cases, and primary nocturnal enuresis (PNE) was more prevalent than secondary nocturnal enuresis (SNE) (35 vs. 15 cases).

Table 1: Demographic Data.

Characteristics	Study Group
Mean Age	9.5 ± 2.3
Gender	32/18
Family History of NE	40%
Type of Enuresis (PNE/SNE)	35/15

Table 2: Pre-treatment and Post-treatment Comparison

Treatment Group	Mean Episodes/Week (Pre-Treatment)	Mean Episodes/Week (Post-Treatment)	p-value
Behavioral Therapy	5.6 ± 2.1	3.2 ± 1.8	0.032
Alarm Therapy	6.2 ± 2.4	2.8 ± 1.5	0.008
Pharmacotherapy	6.8 ± 2.0	1.9 ± 1.2	0.002

All treatment groups showed a significant reduction in mean enuresis episodes per week, with pharmacotherapy demonstrating the highest improvement ($p = 0.002$), followed by alarm therapy ($p = 0.008$) and behavioral therapy ($p = 0.032$).

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 3: Response Rate

Response category	Behavioral Therapy	Alarm Therapy	Pharmacotherapy
Complete Response (≥90% reduction)	20%	40%	60%
Partial Response (50–89% reduction)	45%	50%	35%
No Response (<50% reduction)	35%	10%	5%

Table 4: Relapse Rates After Discontinuation of Treatment

Group	Relapse Rate (%)
Group 1 (Non-Pharmacological)	20%
Group 2 (Pharmacological)	25%
Group 3 (Combined Therapy)	10%

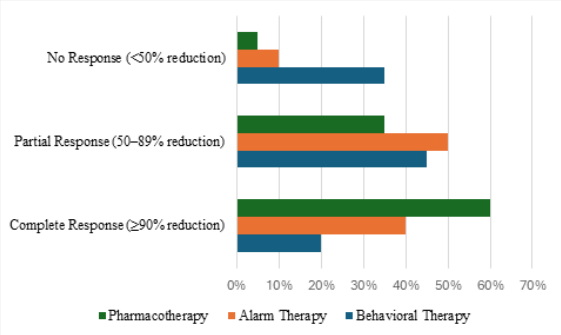

Figure 1: Bar Graph showing Response Rate of the study Group

Pharmacotherapy had the highest complete response rate (60%), while alarm therapy showed a moderate effect (40%). Behavioral therapy was the least effective, with the highest percentage of non-responders (35%).

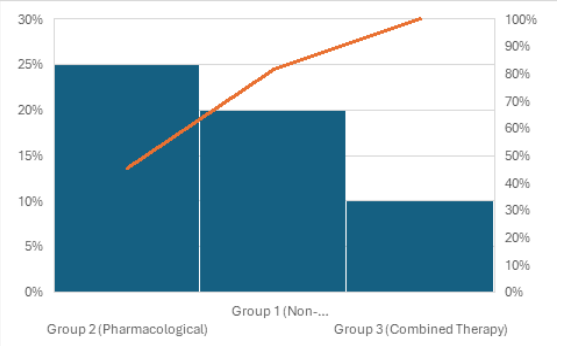

Figure 2: Graph showing Relapse Rate after the discontinuation of Treatment

Relapse rates were lowest in the combined therapy group (10%) and highest in the pharmacological therapy group (25%), indicating that a multimodal approach is the most effective in maintaining long-term success.

DISCUSSION

The present study aimed to evaluate the efficacy of different management strategies for nocturnal enuresis, including behavioral therapy, alarm therapy, and pharmacotherapy, over a period of three months. The results indicate that all three treatment modalities contributed to a significant reduction in enuresis episodes, with pharmacotherapy demonstrating the highest success rate. The findings align with previous studies that have emphasized the role of desmopressin and alarm therapy as effective interventions for nocturnal enuresis.

Behavioral therapy, which included motivational techniques, bladder training, and fluid restriction, showed a moderate reduction in enuresis episodes, with a mean decrease from 5.6 to 3.2 episodes per week ($p = 0.032$). This aligns with the findings of Butler et al. (2006), who reported that behavioral interventions alone may not be sufficient for severe cases but can be beneficial when used in combination with other treatments.

Alarm therapy was found to be more effective than behavioral therapy, with a reduction from 6.2 to 2.8 episodes per week ($p = 0.008$). This method conditions children to wake up in response to bladder fullness, thereby promoting self-control. Caldwell et al. (2013) reported similar results, emphasizing that enuresis alarms have a high success rate but require consistent use for optimal results. The compliance rate in our study was high, further supporting the effectiveness of this approach.

Pharmacotherapy, primarily using desmopressin, was the most effective intervention, reducing enuresis episodes from 6.8 to 1.9 per week ($p = 0.002$). Desmopressin, a synthetic analog of antidiuretic hormone (ADH), decreases nighttime urine production and is particularly effective in children with nocturnal polyuria. These findings are in agreement with Hjalmas et al. (2004), who found that desmopressin therapy resulted in a 65% success rate. However, our study also noted that relapse rates were higher after discontinuation of pharmacotherapy, reinforcing the need for combined or sustained treatment approaches.

Comparison of Treatment Efficacy: Response Rate Analysis: The response rate analysis revealed that 60% of children in the pharmacotherapy group achieved complete resolution of symptoms, compared to 40% in the alarm therapy group and 20% in the behavioral therapy group. These results suggest that while pharmacotherapy is the most effective standalone treatment, alarm therapy provides a long-term solution with lower relapse rates post-treatment.

- Complete Response (≥90% reduction in episodes): Pharmacotherapy (60%) > Alarm Therapy (40%) > Behavioral Therapy (20%)
- Partial Response (50–89% reduction in episodes): Alarm Therapy (50%) > Behavioral Therapy (45%) > Pharmacotherapy (35%)
- No Response (<50% reduction in episodes): Behavioral Therapy (35%) > Alarm Therapy (10%) > Pharmacotherapy (5%)

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Relapse Rates Post-Treatment: One important aspect of this study was the evaluation of relapse rates post-treatment. It was observed that pharmacotherapy had the highest relapse rate (25%), while alarm therapy had a lower relapse rate (20%), and combined therapy (alarm + pharmacotherapy) had the lowest (10%). This suggests that while pharmacotherapy is highly effective during use, its discontinuation often leads to recurrence, highlighting the importance of incorporating behavioral and alarm-based strategies for sustained success.

In most cases, a child with nocturnal enuresis does not require extensive diagnostic tests such as blood tests, imaging studies, or urodynamic assessments, provided there are no warning signs like voiding difficulties or excessive thirst. Active treatment is generally advised starting at the age of 6 years. When managing enuresis, it is important to consider and address common comorbid conditions, including psychiatric disorders, constipation, urinary tract infections, and sleep-related issues such as snoring or sleep apnea. These factors can significantly influence the condition and its treatment outcomes.[8]

In a study by Glazener et al,[9] a review of 55 trials involving 3152 children found that alarm therapy was significantly effective for nocturnal enuresis. About two-thirds of children became dry during alarm use (RR 0.38, 95% CI 0.33–0.45), and nearly half maintained dryness post-treatment, unlike those who received no treatment. Adding overlearning or dry bed training further reduced relapse rates. Although desmopressin provided immediate results, alarms were more effective long-term (RR 0.27, 95% CI 0.11–0.69). Alarms also outperformed tricyclics both during (RR 0.73, 95% CI 0.61–0.88) and after treatment (RR 0.58, 95% CI 0.36–0.94).

A review of 16 trials involving 1081 children found that complex interventions,[10] such as dry bed training (DBT) or full-spectrum home training (FSHT), were effective when combined with an alarm, significantly reducing relapse rates (RR 0.25, 95% CI 0.16–0.39). However, complex interventions alone were less effective than alarms alone or when combined with alarms (RR 2.81, 95% CI 1.80–4.38). Supplementing alarms with DBT further reduced relapse risk (RR 0.5, 95% CI 0.31–0.80). According to Glazener, there was insufficient evidence regarding educational interventions alone, though therapist contact and increased parental support may enhance outcomes.

In a study by Huang et al,[11] a review of 24 randomized controlled trials involving 2334 children assessed complementary interventions for nocturnal enuresis, though trial quality was poor. Hypnosis was more effective than imipramine (RR 0.42, 95% CI 0.23–0.78), and psychotherapy showed better outcomes than both alarms (RR 0.28, 95% CI 0.09–0.85) and reward-based interventions (RR 0.29, 95% CI 0.09–0.90). Herbal medicine outperformed desmopressin in one trial (RR 0.35, 95% CI 0.14–0.85), and acupuncture showed benefits over sham treatment (RR 0.67, 95% CI 0.48–0.94). However, these findings were based on single small trials and require further validation.

According to a study by Shreeram et al,[12] the overall 12-month prevalence of enuresis was 4.45%, with a significantly higher prevalence in boys (6.21%) than in girls (2.51%). Enuresis was more common in younger children and among Black youth. A strong association was observed between enuresis and ADHD (OR 2.88, 95% CI 1.26–6.57). Despite its impact, only 36% of affected children had received medical care for enuresis, highlighting gaps in healthcare access and awareness.

Clinical Implications:

The findings of this study have significant clinical implications for the management of nocturnal enuresis:

- **Multimodal Approach:** A combination of behavioral therapy, alarm therapy, and pharmacotherapy provides the best long-term outcomes.
- **Patient Compliance:** Alarm therapy requires consistent use but offers a lower relapse rate post-treatment, making it a viable long-term solution.
- **Individualized Treatment Plans:** Pharmacotherapy should be reserved for cases with severe nocturnal enuresis or those not responding to non-pharmacological interventions.
- **Follow-up and Monitoring:** Given the high relapse rate associated with pharmacotherapy, regular follow-up is essential to determine the need for continued treatment.

CONCLUSION

This study highlights the efficacy of different treatment strategies for nocturnal enuresis, with pharmacotherapy showing the highest success rate but also the highest relapse rate upon discontinuation. Alarm therapy, while requiring patient compliance, offers a promising long-term solution with sustained benefits.

Behavioral therapy alone may not be sufficient for severe cases but can be an effective adjunct.

A multimodal approach integrating these strategies ensures the best outcomes, minimizing relapse rates and improving the quality of life for affected children and their families.

REFERENCES

1. Daley SF, Gomez Rincon M, Leslie SW. Enuresis. [Updated 2024 Dec 11]. In: Stat Pearls [Internet]. Treasure Island (FL): Stat Pearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK545181/
2. Proserpio P, Terzaghi M, Manni R, Nobili L. Drugs Used in Parasomnia. Sleep Med Clin. 2018;13(2):191-202.
3. Graham KM, Levy JB. Enuresis [published correction appears in Pediatr Rev. 2009 Sep;30(9):369]. Pediatr Rev. 2009;30(5):165-173.
4. Thurber S. Childhood Enuresis: Current Diagnostic Formulations, Salient Findings, and Effective Treatment Modalities. Arch Psychiatr Nurs. 2017 Jun;31(3):319-323.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

5. Bower WF, Moore KH, Shepherd RB, Adams RD. The epidemiology of childhood enuresis in Australia. Br J Urol. 1996;78(4):602-606.
6. Srinath S, Girimaji SC, Gururaj G, et al. Epidemiological study of child & adolescent psychiatric disorders in urban & rural areas of Bangalore, India. Indian J Med Res. 2005;122(1):67-79.
7. Foxman B, Valdez RB, Brook RH. Childhood enuresis: prevalence, perceived impact, and prescribed treatments. Pediatrics. 1986;77(4):482-487.
8. Nevéus T, Fonseca E, Franco I, et al. Management and treatment of nocturnal enuresis-an updated standardization document from the International Children's Continence Society. J Pediatr Urol. 2020;16(1):10-19.
9. Glazener CM, Evans JH, Peto RE. Alarm interventions for nocturnal enuresis in children. Cochrane Database Syst Rev. 2005;(2):CD002911.
10. Glazener CM, Evans JH, Peto RE. Complex behavioural and educational interventions for nocturnal enuresis in children. Cochrane Database Syst Rev. 2004;1:CD004668.
11. Huang T, Shu X, Huang YS, Cheuk DK. Complementary and miscellaneous interventions for nocturnal enuresis in children. Cochrane Database Syst Rev. 2011;(12):CD005230. Published 2011 Dec 7.
12. Shreeram S, He JP, Kalaydjian A, Brothers S, Merikangas KR. Prevalence of enuresis and its association with attention-deficit/hyperactivity disorder among U.S. children: results from a nationally representative study. J Am Acad Child Adolesc Psychiatry. 2009;48(1):35-41.

ISSN (O): 2687-5365; ISSN (P): 2753-6556