



## NOCTURNAL ENURESIS IN CHILDREN AND INTERVENTION MODALITIES: A TEACHING HOSPITAL EXPERIENCE

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### ABSTRACT

Nocturnal Enuresis is intermittent incontinence and includes incontinence in discrete episodes while asleep during night. Nocturnal enuresis is not a condition, but a symptom of an underlying condition<sup>47</sup>. Primary nocturnal enuresis (PNE) is nocturnal wetting in a child who has never been dry on consecutive nights for longer than 6 months<sup>49</sup>. It is the more common form, occurring in 80% of cases. Secondary enuresis is the reemergence of enuresis after continence has been established for at least 6 months<sup>48</sup>.

**OBJECTIVE:** To study the intervention modalities in nocturnal enuresis in children in age group from 6 to 12 year.

**MATERIALS AND METHODS:** This is an observational study conducted upon 126 children (n=126) suffering from nocturnal enuresis. The age group included was 6 to 12 year. This study was conducted from Aug, 2017 to Nov, 2018 in a Teaching Hospital in Nizamabad, Telangana State. Behavioural therapy and imipramine were given separately and combined treatment was also given.

**RESULTS:** Among 126 (n=126) children 31 (24.6%) children after six weeks of initiation of behavioural therapy achieved dry nights. 26 (20.64%) children were required imipramine. 69 (54.76%) children didn't improve with imipramine alone and both behavioral therapy as well as imipramine were given. Behavioural therapy had 51.61% (n=16) relapse. Treatment with imipramine had 69.23% (n=18) relapse. Children who were given behavioural therapy along with imipramine had 31.88% (n=22) relapse.

**CONCLUSION:** Nocturnal Enuresis is one of the major problems in children in developing countries like India. Lack of awareness and education programme add up this problem<sup>42</sup>. There will be a significant increase in the knowledge level on nocturnal enuresis after a structured team approach and educating the family. Positive reinforcement and increased social motivation to be nonenuretic were effective in eliminating nocturnal enuresis. Both behavioral therapy as well as imipramine show better results when combined together rather than given alone.

**KEYWORDS :** Nocturnal Enuresis, Behavioural Therapy, Imipramine, Counseling, Education, Psychotherapy, Reward Method.

### INTRODUCTION

The word **enuresis** is derived from a Greek word (enourein) that means "to void urine." **Nocturnal enuresis** is involuntary urination that happens at night while sleeping, after the age when a person should be able to control his or her bladder usually by 3 year. (Involuntary urination that happens during the day is known as diurnal **enuresis**).

Enuresis may occur without lower urinary tract symptoms or a history of bladder dysfunction (monosymptomatic/uncomplicated) or with lower urinary tract symptoms such as change in voiding frequency, daytime wetting, dribbling, and holding maneuvers (nonmonosymptomatic enuresis). Nocturnal enuresis is three times more common than daytime wetting<sup>48</sup>.

Night-time bedwetting is common in childhood, and can cause stigma, stress and inconvenience which affects around 15 to 20% of five year olds, and up to 2% of young adults<sup>2</sup>. In India, an estimated 14 % of children in 6-12 age groups have Nocturnal Enuresis. Reluctance of parents to seek intervention in developing countries like India is thought to be a reason for increased number of cases.

Many a times, the bed-wetting problem is seen with awkwardness. In most cases parents are not fully aware of their child's daily voiding habits<sup>1</sup>. They are not aware of the fact that nocturnal enuresis may take a toll on the child's self-esteem and cause behavioral problems.<sup>32</sup> Our primary aim is to study the intervention modalities in nocturnal enuresis in children in age group from 6 year to 12 year which includes behavioural therapy and treatment with imipramine.

### Review of Literature

There are so many studies regarding nocturnal enuresis since last five decades all over the world including India.

1. Dry-bed training: Rapid elimination of childhood enuresis, September 1974, Pages 147-156. *N.H.Azrin, T.J.Sneed, R.M.Fox*, Anna State Hospital, Anna, Illinois, U.S.A. Rehabilitation Institute, Southern Illinois University, Carbondale, Illinois, U.S.A. The present procedure used a urine-alarm apparatus but added such features as training in inhibiting urination, positive reinforcement for correct

urinations, training in rapid awakening, increased fluid intake, increased social motivation to be nonenuretic, self-correction of accidents, and practice in toileting. After one all-night training session, the 24 enuretic children averaged only two bedwettings before achieving fourteen consecutive dry nights and had no major relapses. The new method appears to be a more rapid, effective and different type of treatment for enuresis.

2. Eur Urol 1994; 25: 43-50. *Watanabe et al.* have proposed a new pathophysiologic classification system for PNE, based upon simultaneous overnight monitoring by EEG and cystometro-grams (CMG)<sup>8</sup>. This classification divides cases of PNE into 3 types: I, IIa and IIb. In type I, there is normal transmission of bladder sensations and subsequent arousal of the activation center, but the progression from light sleep to complete awakening does not occur. In type IIa, bladder sensations are transmitted normally but the arousal center is not activated at all and the child remains in deep sleep. Finally, in type IIb, there is ineffective transmission of urinary sensory signals by a primary disturbance in bladder function. This pathophysiologic classification may help direct treatment modes in the future.

3. Relapse rate and subsequent parental reaction after successful treatment of children suffering from nocturnal enuresis: a 2<sup>1/2</sup> year follow-up of bibliotherapy. Van Londen A, Van Londen-Barentsen MW, Van Son MJ, Mulder GA. 2<sup>1/2</sup> years after an enuresis nocturnal training are presented, including rate of success, percentage and duration of relapse for 113 children (mean age 11.6 year at the start of the training). The bibliotherapeutic treatment by parents did not require any intervention by a professional. Behaviour of parents in the event of a relapse differed between training conditions. Children in the Arousal condition recovered faster from a relapse, 90% of their parents used the Arousal training again at relapse or did not intervene at all and none of them consulted a professional. Clearly they had confidence in the method of Arousal training: combining the alarm device with reinforcement for correct behaviour at the time the alarm goes off. Parents in control conditions did not use the alarm device as often as the parents in the Arousal condition, but tried other means with less success, including consulting professionals.

4. A Direct Comparison of DDAVP and Imipramine, *Vertucci et al.* A multicenter study in Brittan in 1997 (26) used a crossover design in which the use of one drug for 3 weeks was followed by the use of the other for 3 weeks, and vice-versa. The use of DDAVP after imipramine was associated with a superior result, while the use of imipramine after DDAVP was associated with some deterioration<sup>26</sup>.

5. Complementary and miscellaneous interventions for nocturnal enuresis in children Cochrane Systematic Review - Intervention Version published: 20 April 2005. Cathryn MA Glazener, Jonathan HC Evans, Daniel KL Cheuk. Health Services Research Unit, University of Aberdeen, Aberdeen, U.K. In 15 randomised controlled trials, 1389 children were studied, of whom 703 received a complementary intervention. There was weak evidence to support the use of hypnosis, psychotherapy, acupuncture etc.

6. Madhuri Kanitkar and Tarun Dua, (2007) India conducted a study on Nocturnal Enuresis in children of age group 6-12 years and found that treatment was needed to relieve the child and parent of the accompanying anxiety and the stigma attached to it. The study found that most of the parents were unaware of the problem of nocturnal enuresis and the available interventions for it.<sup>42</sup>

7. H Ravi Ramamurthy and Madhuri Kanitkar, (2008) Pune, India conducted a cross-sectional study on Nocturnal Enuresis in children of age group 6-12 years and found that 29% in a selected group of 86 children have Nocturnal Enuresis. It was concluded that the children with recurrent urinary tract infection were more prone to Nocturnal Enuresis.<sup>37</sup>

8. Effectiveness of Structured Teaching Programme on the Knowledge of Nocturnal Enuresis among the Mothers in Selected Area of Bangalore. *Sweety Sampath Et Al.* 2008. To assess the level of knowledge of mothers regarding Nocturnal Enuresis. To determine the effectiveness of structured teaching programme on knowledge of mothers regarding Nocturnal Enuresis. The sample size included in this study will be 50 mothers of children of age group 6-12 years in selected area of Bangalore. There will be a significant increase in the knowledge level on Nocturnal Enuresis among mothers after the structured teaching programme.

9. Prevalence of Monosymptomatic Nocturnal Enuresis and its Correlates in School Going Children of Lucknow, June 2013, Volume 80, Issue6, pp 488–491, *Shitanshu Srivastava, K. L. Srivastava Shivam Shingla.* It is a cross-sectional school based study conducted in a random sample of 1212 school going children of Lucknow belonging to the middle socioeconomic strata. Study reports the prevalence of PMNE to be 12.6 % (95 % CI=10.9–14.3 %) and significant association of enuresis with the presence of home conflicts (adjusted OR= 38.37, 95% CI=20.04–73.47), stress in children due to enuresis (adjusted OR=10.86, 95%CI=5.73–20.57), scolding (adjusted OR = 6.78, 95% CI=3.69–12.44), parental history of enuresis (adjusted OR = 3.57, 95% CI=1.96–6.50), poor scholastic performance (adjusted OR=2.88, 95% CI=1.49–5.56), age 6–8 y (adjusted OR=13.80, 95% CI=4.38–43.45) and living with single parent (adjusted OR=0.34, 95%CI = 0.17–0.68). Prevalence of monosymptomatic nocturnal enuresis MNE was 17.9 % (p = 0.001) among children who were not exclusively breastfed till 6 mo of age in the index study.

10. A Study on Prevalence of Nocturnal Enuresis Among Rural Paediatric and Adolescent Population. *Ramam Sripadal, Venkata Ramudu Ragiri2, Santhoshi Lakshmi Gamini1, Jyothi Bonam1, Divya Bharathi Datla1, Vidya Bhargavi Kodamanchili1.* 2015. 1. Department of Pharmacy practice, GIET School of Pharmacy, Rajahmundry, Andhra Pradesh, India. 2. Department of psychiatry, Rajiv Gandhi Institute of Medical Sciences, Kadapa, Andhra Pradesh, India. A total of 328 individuals were screened for nocturnal enuresis. Among them, 42 individuals were found to be suffering with enuresis and the prevalence was observed to be 12.8%. Out of these 42 individuals, 29 (69%) were paediatrics and 13 (31%) were adolescents. Among the enuretic individuals, 8 (19%) were having the family history of enuresis. Majority (35.7%) of the enuretics were having the frequency of enuresis  $\geq 7$  times per week.

Simple behavioural methods such as rewards also help, especially as first line treatment. People often use complementary methods such as hypnosis, psychotherapy to treat their children, but the review of trials

did not provide good evidence to support this. There was no reliable information comparing complementary methods with established effective methods such as alarms and desmopressin. Further research is needed.

**MATERIALS AND METHODS**

This is an observational study conducted upon 126 children (n=126) who were attending to our outpatient department with history of frequent bedwetting in the nights and associated symptoms such as anxiety, apprehension, school phobia etc. The age group included was 6 to 12 year. This study was conducted from Aug, 2017 to Nov, 2018 in a Teaching Hospital in Nizamabad, Telangana State.

Children below 6 year and above 12 year and individuals who were under the treatment with diuretics and general medical conditions like seizure disorder, diabetes, spina bifida were excluded from the study. Before commencing the study the institutional Ethics Committee clearance was taken. Informed consent from the parent or guardian of each and every child enrolled in this study was obtained.

**Funding:** Funds were offered by companies of commercial products and drugs for investigations, drugs and transportation required for children included in this study throughout the study period.

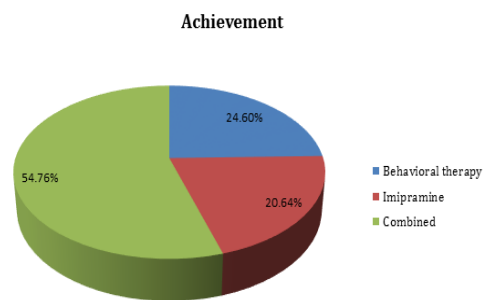
**Study Procedures:** Diagnosis of Nocturnal Enuresis was made by using Diagnostic and statistical manual of mental disorders (DSM-IV) criteria. Once the diagnosis was made initially the child was given behavioral therapy by psychiatrist along with parent counseling and education. It includes reward method, bladder strengthening exercises, waking up child in the midnight to void urine and counseling especially if the child is more than 9 year of age. This is being done in multiple sittings according to the response of the child. After six weeks of behavioral therapy if the results are not satisfactory the child was given imipramine 25 to 50 mg /day prescribed by psychiatrist for 3 months and tapered once the satisfactory improvement is noted. They were followed up for any relapses. The children who did not achieve dry nights even after the usage of imipramine for 3 months were given both behavioral modification therapy as well as imipramine. Follow up was done for another 3 months.

**RESULTS**

After careful follow up the results of this study show 31 (24.6%) children after six weeks of initiation of behavioural therapy achieved dry nights. 26 (20.64%) children were required imipramine. 69 (54.76%) children didn't improve with imipramine alone and both behavioral therapy as well as imipramine were given. This combined treatment showed better results. (Fig.1)

**Achievement after Different Modalities of Treatment**

S. No.	Treatment modality	Achievement
1	Behavioral therapy	24.60% (n=31)
2	imipramine	20.64% (n=26)
3	Combined behavioral therapy and imipramine	54.76% (n=69)
4	Total	100% (n=126)

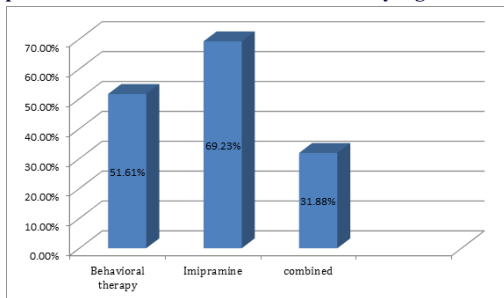


**Fig.1**

Once the successful result after treatment for Nocturnal Enuresis the child was followed up and observed carefully for any relapse. Children those who achieved dry nights after six weeks of initiation of behavioural therapy had 51.61% (n=16) relapse. Those who were treated with imipramine had 69.23% (n=18) relapse. Children who were given behavioural therapy along with imipramine had 31.88% (n=22) relapse. (Fig.2)

**Relapse Rate after successful achievement of dry nights**

S. No.	Treatment modality	Achievement	Relapse Rate
1	Behavioral therapy	24.60% (n=31)	51.61% (n=16)
2	imipramine	20.64% (n=26)	69.23% (n=18)
3	Combined behavioral therapy and imipramine	54.76% (n=69)	31.88% (n=22)

**Relapse Rate after successful achievement of dry nights****Fig.2**

Children who were given behavioural therapy along with imipramine showed better results and had lesser relapse when compared to either treatment alone.

**DISCUSSION**

The present study was done under the guidance of psychiatrist and pediatrician in a teaching hospital. The results show drug therapy for nocturnal enuresis is not enough and it involves so many factors. Child with nocturnal enuresis should be given behavioural therapy initially and even child is on imipramine it is advisable.

Out of 126 individuals (n=126), Children who were given imipramine alone had lesser effect i.e. 24.60% (n=31) of improvement and highest rate of relapse i.e. 69.23% (n=18) when compared to behavioural therapy which showed 24.60% (n=31) achievement and 51.61% (n=16) relapse. Imipramine along with behavioural therapy had much better results. i.e. 54.76% (n=69) achievement and 31.88% (n=22) relapse. It shows the importance of behavioural therapy in a child with nocturnal enuresis.

Our study shows 24.6% (n=31) children after six weeks of initiation of behavioural therapy achieved dry nights. Similarly "Dry-bed training: Rapid elimination of childhood enuresis, September 1974, Pages 147-156. N.H.Azrin, T.J.Sneed, R.M.Fox, Anna State Hospital, Anna, Illinois, U.S.A. Rehabilitation Institute, Southern Illinois University, Carbondale, Illinois, U.S.A." suggests positive reinforcement and increased social motivation to be nonenuretic were effective in eliminating nocturnal enuresis.

Study of "Relapse rate and subsequent parental reaction" by Van Londen A, Van Londen-Barentsen MW, Van Son MJ, Mulder GA shows Children in the Arousal condition recovered faster from a relapse, 90% of their parents used the Arousal training again at relapse or did not intervene at all and none of them consulted a professional. Clearly they had confidence in the method of Arousal training: combining the alarm device with reinforcement for correct behaviour at the time the alarm goes off.

Cochrane Systematic Review in 2005 and other studies suggest complementary intervention such as the use of hypnosis, psychotherapy, acupuncture etc. will show improvement in nocturnal enuresis. Most of the parents were unaware of the problem of Nocturnal Enuresis and the available interventions for it.<sup>13</sup> There will be a significant increase in the knowledge level on Nocturnal Enuresis among mothers after the structured teaching programme.

Prevalence of Monosymptomatic Nocturnal Enuresis and its Correlates in School Going Children of Lucknow, June 2013 *Shitanshu Srivastava, K. L. Srivastava Shivam Shingla*. This study shows significant association of enuresis with the presence of home conflicts stress in children due to enuresis (adjusted OR = 10.86, 95%CI = 5.73-20.57), scolding (adjusted OR = 6.78, 95% CI = 3.69-12.44), parental history of enuresis (adjusted OR = 3.57, 95% CI = 1.96-6.50), poor scholastic performance (adjusted OR = 2.88, 95% = 1.49-5.56), age 6-8 y (adjusted OR = 13.80, 95% CI = 4.38-43.45) and living with

single parent (adjusted OR = 0.34, 95% CI = 0.17-0.68). Our study has similarities with this study i.e. causative factor. Once this cause is eliminated or behavioural therapy is given improvement may be seen.

**Merits and Demerits:** This study was done under the guidance of psychiatrist and pediatrician. The diagnosis of nocturnal enuresis was done according to DSM-IV criteria. Before confirming diagnosis child was examined carefully and necessary investigations like CUE, ultra sound scanning abdomen including pelvis were done. Team approach was there even enquiry was done regarding family atmosphere, school environment and if necessary visiting of these areas was also taken place. This study concentrates mainly on behavioural therapy which is more effective. This includes positive reinforcement, rewards, bladder strengthening exercises, arousal training, hypnotherapy; psychotherapy etc. counseling the parent/ guardian and educating the family were also given importance.

However, this study was conducted in children, who were attending to our hospital. Thus our findings may not represent the exact picture in the population. Treatment with imipramine is given for 3 months only and it may take some more time to be effective. So even though behavioural therapy shows good results we can't deny treatment with imipramine.

**Recommendations:** Factors that cause enuresis include genetic factors, bladder dysfunction, psychological factors, and inappropriate antidiuretic hormone secretion, leading to nocturnal polyuria. Diagnosis consists of detailed medical history, clinical examination, frequency-volume charts, and appropriate investigations. The frequency-volume chart or voiding diary helps in establishing diagnosis and tailoring therapy. The first step in treating nocturnal enuresis is to counsel the parents and the affected child about the condition and reassure them that it can be cured. One of the effective strategies to manage enuresis is alarm therapy, but currently, it is not easily available in India. Desmopressin has been used in the treatment of nocturnal enuresis for close to 50 years. It provides an effective and safe option for the management of nocturnal enuresis. This review covers the diagnosis and management of nocturnal enuresis and introduces the concept of "bedwetting clinics" in India, which should help clinicians in the thorough investigation of bedwetting cases. It needs to concentrate on the part of thorough enquiry regarding family environment, school environment of the child presenting with nocturnal enuresis. Most of the times simple elimination of stressful condition will give better results. Behavioural therapy and team approach will have definite improvement which includes patient as well as parent or guardian counseling and family education.

Treatment with imipramine may be prolonged if necessary under the guidance of psychiatrist. But side effects of imipramine should be treated cautiously such as cardiac arrhythmias. Desmopressin may be tried whenever required. Further study and research is needed regarding nocturnal enuresis to choose better intervention modality.

**CONCLUSION**

Nocturnal enuresis is a common problem affecting school-aged children worldwide. Although it has significant impact on child's psychology, it is always under-recognized in India and considered as a condition which will outgrow with advancing age. Nocturnal enuresis classified as primary or secondary and monosymptomatic or nonmonosymptomatic. Children with recurrent urinary tract infection were more prone to Nocturnal Enuresis. Positive reinforcement and increased social motivation to be nonenuretic were effective in eliminating nocturnal enuresis. Stress, school phobia, family environment play major role in etiology of nocturnal enuresis. Once the child is relieved from these conditions along with behavioural therapy there will be better results rather than depending on drugs. Counseling, educating the family are also utmost important when treating the child with nocturnal enuresis.

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