Sleep Quality in Children with Primary Nocturnal Enuresis

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Abstract

Objectives: The aim of this study was to compare a group of children with primary nocturnal enuresis (PNE) with a healthy control group by assessing sleep quality.

Methods: This observational study comprised of 116 children aged between 5 and 15; 58 children, who had natural PNE and had attended the urology clinic as outpatients, and 58 healthy controls, who had referred to Baqiyatallah and Najmiyeh hospitals, Tehran, in 2016 and were selected by simple random sampling. All participants performed the Pittsburgh sleep quality index (PSQI) test. The SPSS 13.0 (SPSS Inc.) software was used for data analysis.

Results: Ten children (17%) from patients with PNE were preterm or had a difficult delivery (P = 0.02). Most healthy children (n = 26) had eight to ten hours of sleep each night, while in patients, the largest number (n = 28) had six to eight hours of sleep each night (P = 0.09). The need for the presence of parents or toys was higher in children with PNE. Being accustomed to eating and drinking before bedtime was significantly higher in children with PNE (P < 0.05). Sleep apnea was significantly higher in children with PNE (P < 0.05). Parents of 52 children mentioned nocturnal PNE as the only reason for lack of good sleep in their children (P = 0.01).

Conclusions: Sleep problems in children with enuresis is one of the most important problems, which affects their lives. The current study confirms sleeping problems in children with enuresis. Sleep and enuresis have mutual impressions and one has to consider improvising of sleep quality in children with enuresis.

Keywords: Nocturnal Enuresis, Quality, Sleep

1. Background

Nocturnal enuresis (NE) is defined as discrete incontinence episodes while an individual is asleep (1). This terminology is used in children as well (2). Enuresis in children without any other symptoms in lower urinary tract includes changed urination frequency, incontinence throughout the day, urgency, hesitancy, straining, a weak stream, intermittency, holding maneuver, a feeling of incomplete evacuation, post-voiding dribble, and pain in genital or lower urinary tract without a history of bladder dysfunction, which is defined as mono-symptomatic nocturnal enuresis (MNE) and primary nocturnal enuresis (PNE) in children, who have not received a previous dry period of at least six months (3).

Effective treatment can improve sleep quality in children. According to studies, there is no successful treatment for NE (2). Behavioral therapy should be considered in all children with bed-wetting, yet this therapy can be difficult to become reality and applied, since a successful behavioral therapy needs a supportive parent, a motivated child, patience and an average of about six months of therapy (4). Another alternative for the cure of NE is bed-wetting alarm therapy. For medical therapy, desmopressin acetate seems to have an effective role in controlling NE. There is currently no agreement regarding which therapy to choose for different patients. Some studies confirm the medical therapy, however, others support behavioral therapy (5).

Nocturnal enuresis is known as a bio-behavioral problem common in early childhood (6). The overall prevalence of NE declines with older age (7). Most of these children improve bed-wetting and achieve nighttime bladder control without any therapy and so the quality of sleep of these children will be improved. The current data has indicated...
an annual healing rate of 15% (8). Therefore, it is difficult to decide on medical or other therapies. It seems that assessment of mood, life, and sleep quality in children with enuresis may help decisions on this issue. The current researchers aimed at assessing life and sleep quality of these children. There is limited data in this area in Iranian children.

2. Methods

This observational study comprised of 116 children from the age of 5 to 15 years old (62 males and 54 females). Fifty-eight children with PNE, who referred to Baqiyatallah and Najmiyeh hospitals, Tehran, during year 2016, were selected by simple random sampling. The RANUNI function in the SAS software was used for randomization. Out of the study population, 58 cases with PNE were matched by age, gender, congenital anomalies, and body mass index (BMI) with 58 controls without any evidence of PNE attending the general medicine outpatient clinics. Records of all cases and controls were reviewed by a single physician (MP) and important data were recorded.

Clinical diagnosis of the patient group was done by a urologist with ten years of experience. The patients with any sign of bladder dysfunction (urinating more than seven times a day, urinating less than three times a day, sense of urgency in the urine, wetting on the way to the toilet, lack of full discharge of urine and pain or straining during urination), a history of urological diseases (obstruction, reflux, nervous bladder and other urinary tract anomalies, urinary incontinence during awakening, patients with recent urinary tract infection, systemic disorders such as acute myocardial diseases, lung, liver, kidney and patients with diabetes mellitus, using of tricyclic antidepressants (TCAs), selective serotonin reuptake inhibitors (SSRIs) and diuretics, carbamazepine, chlorpromazine, loperamide and hyper-reactive drugs, and a history of psychiatric disorders, depression and anxiety were excluded from the study.

A detailed case history was obtained and a physical examination was carried out to exclude urologic or neurologic abnormalities. Routine chemical analysis of blood, urine analysis, and culture and ultrasound measurements of residual urine volume were conducted.

The sleep quality of the children in this study were assessed using the Pittsburgh sleep quality index (PSQI). Subjective assessment of sleep over the past month was evaluated using the PSQI questionnaire. This was designed to provide a standardized measurement of sleep quality. The scale is straightforward and consists of 19 self-assessed items grouped in seven components, weighted zero to three. The overall score ranged from 0 to 21, with lower scores indicating better quality of sleep. An overall score of > 5 on the PSQI indicates serious problems relating to at least two components, or moderate difficulties relating to more than three components (9).

2.1. Statistical Analysis

Student’s t and Chi-square tests were used for comparison between data of the patient and control groups. Pearson’s or Spearman’s correlation analyses were used for evaluating relationships between various variables. Statistical analyses were carried out using the SPSS 13.0 software (SPSS Inc.). P values of < 0.05 were considered significant.

2.2. Ethical Considerations

This research study followed the tenets of the declaration of Helsinki and written informed consent was obtained from all patients. The study was approved by the institutional review board.

3. Results

Eventually, 116 children (62 males and 54 females) were studied. Fifty-eight children had PNE that were compared with 58 control children. Most children (59.5%) were eight to eleven years old; 31% were younger than seven and 9.5% were older than twelve years old.

Ten children (17%) of patients with PNE were preterm or had a difficult delivery (P = 0.02). Table 1 shows the demographic data of children.

Most healthy children (26) had eight to ten hours of sleep each night, while in patients, the largest number (28) had six to eight hours of sleep each night (P = 0.09) (Table 2).

In both controls and patients, children slept in less than 30 minutes (P = 0.08).

Seventy-four percent of children in the patient group (n = 43) woke up at 6 pm to 7 am on school days (P = 0.01) (Table 2).

In both controls and patients, children slept in less than 30 minutes (P = 0.08).

Fifty-six percent of patients (n = 32) slept at 10 to 11 pm on school days. This occurred in 41% of children in the control group (P = 0.02).

In terms of sleeping habits, no significant difference was seen in going to bed alone, sleeping with others, certain habits of children in bed and fear of sleeping alone, between the two groups (P > 0.05). However, the need for the presence of parents or toys was higher in children with PNE.

In terms of sleep environmental conditions, no significant difference was seen in watching TV at bedtime and fear of darkness between controls and cases (P > 0.05).
# Table 1. Demographic Data

| Variables         | Patients* | Controls* | P Value |
|-------------------|-----------|-----------|---------|
| Fathers           |           |           |         |
| Educational level |           |           |         |
| Illiterate        | 1 (1)     | 0 (0)     | 0.001   |
| Under diploma     | 19 (32)   | 3 (5)     |         |
| Diploma           | 18 (31)   | 25 (43)   |         |
| Academic          | 20 (34)   | 30 (51)   |         |
| Smoking           | 23 (39)   | 9 (15)    | 0.004   |
| Mothers           |           |           |         |
| Educational level |           |           | 0.01    |
| Illiterate        | 7 (1)     | 25 (43)   |         |
| Under diploma     | 32 (55)   | 32 (55)   |         |
| Diploma           | 11 (19)   | 1 (2)     |         |
| Academic          | 8 (14)    | 0 (0)     |         |
| Smoking           | 4 (6)     | 0 (0)     | 0.04    |
| Normal pregnancy, % | 19        | 100       | 0.02    |

* values are represented as (%)
Footnote

Authors' Contribution: All authors contributed equally to this study.

References

1. Neveus T, von Gontard A, Hoebeke P, Hjalmas K, Bauer S, Bower W, et al. The standardization of terminology of lower urinary tract function in children and adolescents: report from the Standardisation Committee of the International Children’s Continence Society. *J Urol*. 2006;176(1):314-24. doi: 10.1016/S0022-5347(06)00305-3. [PubMed: 16753432].

2. Ucer O, Gumus B. Quantifying subjective assessment of sleep quality, quality of life and depressed mood in children with enuresis. *World J Urol*. 2014;32(1):239-43. doi: 10.1007/s00345-013-1193-1. [PubMed: 24150187]. [PubMed Central: PMC3901928].

3. Lottmann HB, Alova I. Primary monosymptomatic nocturnal enuresis in children and adolescents. *Int J Clin Pract Suppl*. 2007;(155):8-16. doi: 10.1111/j.1742-1241.2007.01464.x. [PubMed: 17727574].

4. Robson WLM. Current management of nocturnal enuresis. *Curr Opin Urol*. 2008;18(4):425-30. doi: 10.1097/MOU.0b013e3282feca9c. [PubMed: 18520767].

5. Hjalmas K, Arnold T, Bower W, Caione P, Chiozza LM, von Gontard A, et al. Nocturnal enuresis: an international evidence based management strategy. *J Urol*. 2004;171(6 Pt 2):2545-61. [PubMed: 1518418].

6. Hjalmas K. Nocturnal enuresis: basic facts and new horizons. *Eur Urol*. 1998;33 Suppl 3:53-7. [PubMed: 9599740].

7. Byrd RS, Weitzman M, Lanphear NF, Auinger P. Bed-wetting in US children: epidemiology and related behavior problems. *Pediatrics*. 1996;98(3 Pt 1):414-9. [PubMed: 8784366].

8. Kuehhas FE, Djakovin N, Hohenfellner M. Infantile Enuresis: Current State-of-the-Art Therapy and Future Trends. *Rev Urol*. 2011;13(1):1-5. [PubMed: 21826122]. [PubMed Central: PMC3155158].

9. Mesquita G, Reimao R. Quality of sleep among university students: effects of nighttime computer and television use. *Acta Neuropsychiatr*. 2010;68(5):270-5. [PubMed: 21049182].

10. Cohen-Zrubavel V, Kushnir B, Kushnir J, Sadeh A. Sleep and sleepiness in children with nocturnal enuresis. *Sleep*. 2011;34(2):191-4. [PubMed: 21286252]. [PubMed Central: PMC322939].

11. Prades ME, Moré EE. [Symptoms of sleep-disordered breathing in children]. *Acta Otorrinolaringol Esp*. 2010;61:1-5. Spanish.

12. Brooks LJ, Topol HI. Enuresis in children with sleep apnea. *J Pediatr*. 2003;142(5):515-8. doi: 10.1067/mpd.2003.158. [PubMed: 12756383].

13. Dhondt K, Baert E, Van Herzele C, Raes A, Groen LA, Hoebeke P, et al. Sleep fragmentation and increased periodic limb movements are more common in children with nocturnal enuresis. *Acta Paediatr*. 2014;103(6):e268-72. doi: 10.1111/apa.12610. [PubMed: 24612370].

14. Dhondt K, Raes A, Hoebeke P, Van Laecke E, Van Herzele C, Vande Walle J. Abnormal sleep architecture and refractory nocturnal enuresis. *J Urol*. 2009;182(4 Suppl):1961-5. doi: 10.1016/j.juro.2009.05.03. [PubMed: 19695632].

15. Gozmen S, Keskin S, Akil I. Enuresis nocturna and sleep quality. *Pediatr Nephrol*. 2008;23(8):1293-6. doi: 10.1007/s00467-008-0817-y. [PubMed: 18506489].
### Table 2. Sleep Features of Children

| Sleep Feature                                      | Controlsa | Casesa | P Value |
|---------------------------------------------------|-----------|--------|---------|
| **The average child sleep at night**              |           |        | 0.09    |
| 4 - 6 h                                           | 6 (10)    | 1 (2)  |         |
| 6 - 8 h                                           | 21 (36)   | 28 (48)|         |
| 8 - 12 h                                          | 26 (45)   | 20 (34)|         |
| 12 < h                                            | 5 (9)     | 9 (16) |         |
| **Time to sleep**                                 |           |        | 0.08    |
| < 30 min                                          | 50 (86)   | 48 (83)|         |
| 30 - 60 min                                       | 7 (12)    | 9 (15) |         |
| > 60 min                                          | 1 (2)     | 1 (2)  |         |
| **Wake up time on school days**                   |           |        | 0.01    |
| 5 - 6 am                                          | 3 (5)     | 1 (2)  |         |
| 6 - 7 am                                          | 28 (43)   | 43 (74)|         |
| 7 - 7:30 am                                       | 26 (44)   | 7 (12) |         |
| > 7:30 am                                         | 1 (2)     | 7 (12) |         |
| **Wake up time on holidays**                      |           |        | 0.3     |
| 6 - 7 am                                          | 1 (2)     | 0 (0)  |         |
| 7 - 8 am                                          | 9 (16)    | 20 (34)|         |
| 8 - 9 am                                          | 24 (41)   | 25 (43)|         |
| > 9 am                                            | 24 (41)   | 13 (22)|         |
| **Sleep time on school days**                     |           |        | 0.02    |
| 7 - 8 pm                                          | 6 (11)    | 0 (0)  |         |
| 8 - 10 pm                                         | 18 (31)   | 12 (20)|         |
| 10 - 11 pm                                        | 24 (41)   | 32 (56)|         |
| > 11 pm                                           | 10 (17)   | 14 (24)|         |
| **Sleep time on school days**                     |           |        | 0.71    |
| 8 - 9 pm                                          | 7 (12)    | 5 (9)  |         |
| 9 - 11 pm                                         | 14 (24)   | 21 (21)|         |
| 11 - 12 pm                                        | 25 (43)   | 23 (40)|         |
| > 12 pm                                           | 12 (21)   | 17 (30)|         |
| **Sleep Quality**                                 |           |        |         |
| Getting out of bed                                |           |        | 0.01    |
| Always                                            | 9 (15)    | 20 (34)|         |
| Usually                                           | 28 (48)   | 4 (7)  |         |
| Some times                                        | 18 (31)   | 14 (24)|         |
| Waking during sleep                               |           |        |         |
| Never                                             | 10 (17)   | 28 (48)|         |
| Some times                                        | 36 (62)   | 21 (39)|         |
| Usually                                           | 10 (17)   | 3 (5)  |         |
| Always                                            | 2 (3)     | 4 (6)  |         |
| Shaking head during sleep                         |           |        | 0.55    |
| Never                                             | 51 (91)   | 52 (89)|         |
| Some times                                        | 3 (6)     | 2 (3)  |         |
| Usually                                           | 0 (0)     | 2 (3)  |         |
| Crying or screaming during sleep                  |           |        | 0.08    |
| Never                                             | 52 (89)   | 43 (74)|         |
| Some times                                        | 6 (11)    | 14 (24)|         |
| Usually                                           | 0 (0)     | 1 (2)  |         |
| Sleep discomfort                                  |           |        | 0.62    |
| Symptom                        | Level          | Never | Some times | Usually | Always |
|--------------------------------|----------------|-------|------------|---------|--------|
| **Limb movement**              |                |       |            |         |        |
| Never                          |                | 43    | 38         | 2       | 0      |
| Some times                     |                | 11    | 17         | 7       | 0      |
| Usually                        |                | 2     | 3          | 1       | 1      |
| **Sleep foot pain**            |                |       |            |         |        |
| Never                          |                | 40    | 30         | 7       | 0      |
| Some times                     |                | 11    | 15         | 7       | 0      |
| Usually                        |                | 2     | 3          | 1       | 1      |
| **A light sleep**              |                |       |            |         |        |
| Never                          |                | 24    | 24         | 9       | 1      |
| Some times                     |                | 24    | 7          | 3       | 0      |
| Usually                        |                | 9     | 5          | 3       | 0      |
| **Fatigue after waking**       |                |       |            |         |        |
| Never                          |                | 41    | 35         | 6       | 1      |
| Some times                     |                | 10    | 15         | 5       | 0      |
| Usually                        |                | 6     | 5          | 2       | 0      |
| **Sleeping in school**         |                |       |            |         |        |
| Never                          |                | 54    | 52         | 4       | 0      |
| Some times                     |                | 2     | 4          | 2       | 0      |
| Usually                        |                | 2     | 2          | 3       | 0      |
| **Going to bed resistance**    |                |       |            |         |        |
| Never                          |                | 27    | 29         | 4       | 1      |
| Some times                     |                | 27    | 10         | 12      | 0      |
| Usually                        |                | 4     | 12         | 2       | 0      |
| **Awakening**                  |                |       |            |         |        |
| Three or more times a week     |                | 1     | 0          | 0       | 0      |
| One to 2 times a week          |                | 14    | 4          | 7       | 0      |
| Less than 1 time per week      |                | 10    | 5          | 8       | 0      |
| Not even a month ago           |                | 23    | 49         | 85      | 0      |
| **Need to bathe for sleeping** |                |       |            |         |        |
| Three or more times a week     |                | 1     | 0          | 0       | 0      |
| One to 2 times a week          |                | 1     | 1          | 2       | 0      |
| Less than 1 time per week      |                | 0     | 6          | 10      | 0      |
| Not even a month ago           |                | 56    | 51         | 87      | 0      |
| **Breathing dysfunction**      |                |       |            |         |        |
| Three or more times a week     |                | 0     | 5          | 8       | 0      |
| One to 2 times a week          |                | 8     | 2          | 3       | 0      |
| Less than 1 time per week      |                | 2     | 3          | 6       | 0      |
| Not even a month ago           |                | 48    | 48         | 83      | 0      |
| **Cough or loud snoring**      |                |       |            |         |        |
| Three or more times a week     |                | 2     | 5          | 8       | 0      |
| One to 2 times a week          |                | 5     | 3          | 6       | 0      |
| Less than 1 time per week      |                | 4     | 8          | 33      | 0      |
| Not even a month ago           |                | 47    | 42         | 73      | 0      |
| Feeling cold in sleep | 0.79 |
|-----------------------|------|
| Three or more times a week | 1 (2) | 2 (3) |
| One to 2 times a week | 2 (3) | 3 (6) |
| Less than 1 time per week | 5 (6) | 7 (12) |
| Not even a month ago | 50 (87) | 46 (79) |

| Feeling heat in sleep | 0.01 |
|-----------------------|------|
| Three or more times a week | 0 (0) | 7 (12) |
| One to 2 times a week | 5 (8) | 1 (2) |
| Less than 1 time per week | 7 (12) | 5 (8) |
| Not even a month ago | 46 (80) | 45 (78) |

| Feeling pain in sleep | 0.03 |
|-----------------------|------|
| Three or more times a week | 2 (3) | 11 (19) |
| One to 2 times a week | 7 (12) | 4 (7) |
| Less than 1 time per week | 7 (12) | 3 (6) |
| Not even a month ago | 42 (73) | 40 (68) |

| Need for sleep aid | 0.12 |
|--------------------|------|
| One to 2 times a week | 2 (3) | 1 (2) |
| Less than 1 time per week | 6 (10) | 1 (2) |
| Not even a month ago | 50 (87) | 56 (96) |

| Disruption to stay awake during meals or social activities | 0.59 |
|----------------------------------------------------------|------|
| Three or more times a week | 2 (3) | 2 (3) |
| One to 2 times a week | 4 (7) | 1 (2) |
| Less than 1 time per week | 2 (3) | 2 (3) |
| Not even a month ago | 50 (87) | 53 (92) |

| Having motivation and vitality | 0.21 |
|-------------------------------|------|
| Three or more times a week | 0 (0) | 2 (3) |
| One to 2 times a week | 4 (7) | 9 (16) |
| Less than 1 time per week | 4 (7) | 4 (7) |
| Not even a month ago | 50 (87) | 43 (74) |

| The quality of sleep in the previous month | 0.01 |
|--------------------------------------------|------|
| Very good | 36 (62) | 16 (29) |
| Good | 20 (35) | 31 (53) |
| Rather bad | 2 (3) | 5 (8) |
| Bad | 0 (0) | 6 (10) |

* Values are represented as (%).