ORIGINAL ARTICLE

Study of the profile of behavioral problems and quality of life indexes in a pediatric cohort of monosymptomatic enuresis

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KEYWORDS
Monosymptomatic nocturnal enuresis; Behavioral problems; Quality of life; Treatment with alarm; Desmopressin

Abstract

Objective: To evaluate and correlate, before and after the therapeutic intervention, the behavioral problem scores evaluated by the CBCL/6-18 questionnaire and the quality of life indexes evaluated by the PedsQL™ 4.0 in patients with monosymptomatic nocturnal enuresis.

Method: After the initial evaluation and completion of the CBCL/6-18 questionnaire, a multidisciplinary evaluation and completion of the PedsQL™ 4.0 questionnaire was performed. Of the initially evaluated 140 children and adolescents aged 6–16 years, 58 were excluded due to non-monosymptomatic enuresis or associated comorbidities. Of the initially included 82 patients, who were randomized to three treatment groups, 59 completed the CBCL/6-18 and PedsQL™ 4.0 questionnaires at the end of the treatment and were included in this study. The α error was set at 5% for ruling out the null hypothesis.

Results: Of the total of 59 participants, 45.8% responded with total success, 23.7% were partially successful, 23.7% did not reach the improvement criteria, and 6.8% gave up the treatment. There was a significant increase in quality of life indexes and a reduction of post-intervention behavioral problem scores, in the three proposed modalities, in patients who had a total or partial response to treatment. There was no correlation between higher scores of pre-treatment behavior problems and therapeutic failure.


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**Conclusões:** Only the participants who successfully responded to interventions showed improvement in quality of life and behavioral problems, which indicates that enuresis is a primary problem that has a negative impact on these parameters. The authors suggest that it is possible to achieve success in the treatment of monosymptomatic enuresis, even in patients with high pre-intervention behavioral problem scores.

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**Estudo do perfil dos problemas de comportamento e dos índices de qualidade de vida numa coorte pediátrica de enureses monossintomática**

**Resumo**

**Objetivo:** Avaliar e relacionar, pré e pós-intervenção terapêutica, em pacientes com enureses noturnas monossintomáticas, os escores de problemas de comportamento, avaliados pelo questionário CBCL/6-18, e os índices de qualidade de vida, avaliados pelo PedsQL™ 4.0.

**Método:** Após avaliação inicial e preenchimento CBCL/6-18, procedeu-se avaliação multidisciplinar e preenchimento do PedsQL™ 4.0. Das 140 crianças e adolescentes de 6 a 16 anos inicialmente avaliados, 58 foram excluídos por enureses não monossintomáticas ou comorbididades associadas. Dos 82 pacientes inicialmente incluídos e randomizados a três grupos de tratamento, 59 preencheram o CBCL/6-18 e PedsQL™ 4.0 ao fim do tratamento e puderam ser incluídos neste trabalho. O erro alfa foi estabelecido em 5% para descarte da hipótese de nulidade.

**Resultados:** Do total de 59 participantes 45,8% responderam com sucesso total, 23,7% tiveram sucesso parcial, 23,7% não atingiram critério de melhora e 6,8% desistiram do tratamento. Verificou-se aumento significativo dos índices de qualidade de vida e redução dos escores de problemas de comportamento pré-intervenção, nas três modalidades propostas, nos pacientes que obtiveram resposta total ou parcial ao tratamento. Não se demonstrou correlação entre maiores escores de problemas de comportamento pré-tratamento e insucessos terapêuticos.

**Conclusões:** Apenas os participantes que responderam com sucesso às intervenções, melhoraram em sua qualidade de vida e problemas comportamentais, o que indica que a enuresa é um problema primário que impacta negativamente estes parâmetros. Sugere-se que é viável obter sucesso no tratamento da enureses monossintomática, mesmo em pacientes com altos escores de problemas de comportamento pré-intervenção.

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**Introduction**

Nocturnal enuresis has been described as one of the most prevalent and chronic problems of childhood.¹ The standardization proposal presented by the International Childhood’s Continence Society (ICCS)² defines that enuresis is characterized by episodes of involuntary urination during sleep, in clothing or in bed, in children over 5 years of age with no other clinical condition that can explain them. As for the frequency, episodes should occur at least once a month and may involve variable amounts of nocturnal urinary loss.

The current categorization of the International Childhood’s Continence Society (ICCS)² divides enuresis into monosymptomatic, when there are no other lower urinary tract symptoms, and non-monosymptomatic, when accompanied by daytime symptoms such as containment maneuvers, urinary urgency, altered urination frequency, or diurnal urinary incontinence.¹

Overall, the prevalence is higher among males during the childhood years, with values at around 7 years of age ranging from 15% to 22% in boys and 7% to 15% in girls, with similar values for both genders in adolescence.¹ In Brazil, this prevalence is 10.6%, being 11.7% in males and 8.3% in females.⁵

Currently, enuresis is understood as a disorder whose genetic basis is influenced by physiological and environmental aspects.⁶ It is suggested that enuresis is transmitted by high-penetrance, autosomal dominant inheritance, since according to some studies, the probability of developing enuresis increases from 43% when one parent has a history of enuresis, to 77% when this antecedent is common to both parents, decreasing to 15% in families with no history of the problem.⁷

The pathogenesis of this condition is understood through three mechanisms: high thresholds for arousal to full bladder signs, nocturnal polyuria, and nocturnal detrusor hyperactivity.¹,³

There is no evidence that behavioral problems and poor quality of life lead to urinary control difficulty at night, but there are studies that demonstrate an improvement in behavioral problems after enuresis treatment, suggesting that these problems may be due to an initial picture of...
Profile of behavioral problems and quality of life indexes in monosymptomatic enuresis

one was spontaneously cured while waiting for polysomnography (PSG). The PSG was performed in 87 participants, and 6/87 (6.9%) of them had a diagnosis of apnea, being referred for specialized follow-up. Of the 82/140 (58.6%) patients diagnosed with monosymptomatic nocturnal enuresis (MNE), 62/82 were males (75.6%) and 20/82 were females (24.4%), with a mean age of 9.5 years (±2.66); 72/82 (85.2%) had primary type enuresis and were randomized to three treatment groups: alarm and desmopressin, or isolated use of alarm or desmopressin.

Categorical variables were described as percentages and their respective 95% confidence intervals. Continuous variables were described as means and standard deviation, or median and interquartile range, if they were non-parametric.

Subsequently, the analyses were performed using the paired Student’s t-test and Wilcoxon’s test, if they were non-parametric. For comparison between groups, the ANOVA single factor test was also used.

The alpha error was set at 5% for ruling out the null hypothesis. The evaluation of the treatment outcomes followed the criteria established by ICCS:

- Total response: reduction of at least 90% of enuretic episodes.
- Partial response: reduction of 50–89% of enuretic episodes.
- No response: reduction of 0–49% of enuretic episodes.

The present study was approved by CAPESQ – HCMPUSP and is included as a subproject of a larger project entitled: "Comparative evaluation of the efficacy of the isolated and combined use of nocturnal alarm and desmopressin in the treatment of monosymptomatic nocturnal enuresis," CAPESQ No. 0649/10 and FAPESP No. 2011/17589.

Results

The total number of patients described in this study is 59 children and adolescents aged 6 to 16 years, in whom pre- and post-treatment comparative analysis of CBCL/6-18 and PedsQL™ 4.0 instruments was performed. After randomization, 20 participants received the monotherapy treatment of alarm, 21 received the combined treatment with alarm and desmopressin, and 18 received treatment with desmopressin (1-desamino-8-arginine vasopressin), with an initial dose of 0.2 mg, which could be increased to 0.4 mg if the initial dose did not reduce the number of nocturnal enuresis episodes by 50%. A statistical power calculation was performed, and its index was (1 - β) = 0.967.

Of the total of 59 participants, 45.8% showed total response, 23.7% partial response, 23.7% did not reach the improvement criteria, and 6.8% gave up treatment.

Tables 1 and 2 show, respectively, the comparison of behavioral problem indexes before and after the interventions, and the quality of life scores before and after treatment.

The pre-treatment behavioral problem scores and the intervention outcomes were compared using Wilcoxon’s test, disclosing no significant differences between them in
patients with total or partial response, no response, or those who gave up treatment ($p = 0.124$).

### Discussion

Data from the present study confirm the higher prevalence of nocturnal enuresis in male patients, as shown by the greater number of male patients.\(^1,^5\)

The focus of the present study was to identify whether improving behavioral problems and quality of life scores depended on whether the patient had a total or partial response to treatment, or whether those indexes would improve regardless of treatment outcome, motivated by the inclusion and care offered by the multiprofessional team during the follow-up. These data are not clear in the literature, and there are disagreements on these points.\(^1^1,^8\)

For this purpose, the association between the change in behavioral problem scores and the therapeutic outcome was analyzed. However, it was verified that only those patients who achieved treatment success (total response and partial response) showed a decrease in behavioral problem scores, whereas patients who had treatment failure (no response and those who gave up treatment) did not show significant differences in pre- and post-treatment behavior problem scores.

This finding differs from the results of the study by Pereira et al.\(^1^2\) in which the researchers analyzed, based on a database, the scores of behavioral problems pre- and post-treatment with alarm, evaluated by the CBCL/6-18. Patients in that study showed behavioral problem improvement after treatment of enuresis, regardless of the outcome success.

In the present study, regardless of the type of treatment, medication or alarm, the alarm used in two of the therapeutic subgroups, behavioral problem improvement in patients with total or partial response to treatment shows that enuresis is a primary problem, either generating or in parallel with the behavioral problems. This is also the conclusion of the study by Santos and Silvares,\(^1^3\) which points to enuresis as a possible risk factor for the onset of behavioral problems and not the opposite.

The present study also aimed to compare the scores of pre-treatment behavior problems with the intervention outcomes to evaluate if they could be a possible complicating factor for the successful treatment of monosymptomatic nocturnal enuresis. It was verified that there were no significant differences, both for the internalizing problems, as well as for the externalizing and total problems in the four types of outcomes observed, namely: total response, partial response, absence of response, and giving up the treatment. Higher rates of pre-treatment behavioral problems do not imply a failure of monosymptomatic nocturnal enuresis management. This finding confirms the studies of Sousa\(^1^4\)

### Table 1  Comparison between pre- and post-treatment behavioral problem scores by treatment outcome category in 59 patients with monosymptomatic nocturnal enuresis.

<table>
<thead>
<tr>
<th>P50 (IIQ)</th>
<th>Behavioral problems (CBCL) – pre- and post-treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IT (Pre)</td>
</tr>
<tr>
<td>Total response (27 patients)</td>
<td>64 (9)</td>
</tr>
<tr>
<td>Partial response (14 patients)</td>
<td>54 (12)</td>
</tr>
<tr>
<td>Treatment failure (18 patients)</td>
<td>60.5 (15.5)</td>
</tr>
</tbody>
</table>

IT, internalizing problems; ET, externalizing problems; TT, total problems.

* $p < 0.05$.

### Table 2  Comparison between quality of life scores (assessed by patients and parents) pre- and post-treatment by treatment outcome category in 59 patients with monosymptomatic nocturnal enuresis.

<table>
<thead>
<tr>
<th>Total response (27 patients)</th>
<th>Partial response (14 patients)</th>
<th>Treatment failure (18 patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PedsQL patients</strong></td>
<td><strong>Pre</strong></td>
<td><strong>Post</strong></td>
</tr>
<tr>
<td>Total score</td>
<td>79.6 (12.1)</td>
<td>91.2 (10.8)</td>
</tr>
<tr>
<td>Physical</td>
<td>79.6 (12.5)</td>
<td>98.4 (13.2)</td>
</tr>
<tr>
<td>Emotional</td>
<td>65 (30)</td>
<td>90 (18.7)</td>
</tr>
<tr>
<td>Social</td>
<td>90 (20)</td>
<td>100 (8.7)</td>
</tr>
<tr>
<td>School</td>
<td>75 (17.5)</td>
<td>90 (23.7)</td>
</tr>
</tbody>
</table>

| **PedsQL parents** | **Pre** | **Post** | **Pre** | **Post** | **Pre** | **Post** |
| Total score | 80.2 (16.2) | 91.8 (7.5) | $<0.001^a$ | 84.8 (9.7) | 91.2 (2.5) | 0.049 | 80.1 (13.9) | 89.3 (8) | 0.047 |
| Physical | 90.6 (21) | 100 (2.3) | 0.015 | 100 (3.9) | 100 (1.5) | 0.614 | 96.8 (7.8) | 100 (2.3) | 0.410 |
| Emotional | 80 (32.8) | 87.5 (15) | 0.002 | 72.5 (17.5) | 80 (15) | 0.064 | 60 (46.2) | 90 (13.7) | 0.055 |
| Social | 97.5 (20) | 100 (0) | 0.003 | 100 (2.5) | 100 (0) | 0.192 | 90 (27.5) | 100 (0) | 0.024 |
| School | 70 (48.7) | 90 (22.5) | 0.015 | 87.5 (48.5) | 85 (17) | 0.257 | 95 (45) | 82.5 (33.7) | 0.612 |

* $p < 0.05$. 

\(^a\) indicates statistical significance.
and Ferrari\textsuperscript{15} and contradicts the conclusions of Houts,\textsuperscript{16} and Arantes,\textsuperscript{17} who suggest that patients with higher scores of behavioral problems would have a significant impact, hindering successful enuresis therapeutic management.

Regarding the analysis of the association between quality of life assessed by PedsQL 4.0\textsuperscript{19} and the treatment outcome for monosymptomatic nocturnal enuresis, the present study confirms that both the patients’ own views and their parents’ views improved the quality of life indexes only for patients who were successful in their treatment, especially those who obtained total response. As well as with behavioral problems, enuresis negatively impacts the patient’s quality of life as a primary problem. These data corroborate a study that evaluated 70 children with different types of enuresis (monosymptomatic nocturnal enuresis, non-monosymptomatic enuresis, diurnal enuresis) seeking to associate the treatment of these clinical conditions to the patients’ quality of life. The authors concluded that patients who responded successfully to enuresis treatment achieved a significant quality of life improvement.\textsuperscript{18}

Several studies indicate that the clinical pictures of enuresis and other chronic diseases have a negative impact on quality of life and result in higher scores for behavioral problems when compared to control groups.\textsuperscript{19-26} These studies suggest that psychological support would be important for children with such clinical conditions, but they do not assess the association between therapeutic success, behavioral problems, and quality of life; or, in other words, the question remains whether the psychological condition leads to the physical illness, or vice versa. To the best of the authors’ knowledge, the present study is unique in approaching this topic in monosymptomatic nocturnal enuresis. It has been confirmed that, from both parents’ and patients’ viewpoints, post-treatment quality of life indexes increased only for patients with therapeutic success and consequent improvement of enuresis, and it is postulated that enuresis is a primary problem, which generates low quality of life and behavioral problems, and that its successful treatment is crucial for a healthier life.\textsuperscript{25,26}

The finding that adult individuals with a previous history of nocturnal enuresis in childhood may have an abnormal neuronal response to emotional stimuli suggests that nocturnal enuresis may affect the individual both psychologically and neurologically.\textsuperscript{27} These findings emphasize the importance of the present study’s findings and indicate the need to promote effective treatment of enuresis.

In conclusion, only participants who successfully responded to interventions improved their scores regarding behavioral problems and quality of life, which indicates that enuresis is a primary problem that negatively affects these parameters. These results suggest that enuresis treatment is feasible, and that treatment can be successful regardless of high pre-intervention scores for behavioral problems.

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**Conflicts of interest**

The authors declare no conflicts of interest.

**References**


