

The increased nocturnal urine sodium, calcium, and chloride levels in children with PMNE may be one of the important reasons for the occurrence of nocturnal bladder dysfunction.

Zichao Feng1, Guoxing Wu2, Sida Shao3,Kui Liu4,Jian Guo Wen1#

1.Department of Urology Surgery, The First Affiliated Hospital of Zhengzhou University, Zhengzhou 450052, China;

2.Department of Urology, Children Hospital of Dongguan City, 523888, China;

3.Department of Urology, The First Affiliated Hospital of Xinxiang Medical University, Xinxiang 453100, China;

4.Department of Pediatric Surgery, The First Affiliated Hospital of Henan University of Science and Technology, Luoyang 471000,China;

Background

This is an original study that aims to investigate the correlation between urinary electrolyte levels and detrusor overactivity (DO) in children with primary monosymptomatic nocturnal enuresis (PMNE).

Methods

In this case control study, a retrospective analysis was performed on 60 PMNE children aged 5-12 years who were admitted to the First Affiliated Hospital of Zhengzhou University from February 2015 to January 2020. According to ambulatory urodynamic monitoring (AUM), 36 patients were categorized into nocturnal DO group [(19 males and 17 females, mean age(9.4±2.1) years, mean body mass index (BMI)(18.90±2.66) kg/m 2], and 24 patients, non-nocturnal DO group [16 males and 8 females, mean age(9.0±1.9) years, mean BMI(18.85±2.50) kg/m 2]. Daytime and nighttime urine volume and average urine electrolyte levels were measured. t-test, Chi-square test or Mann-Whitney U test were used for comparison between groups. Spearman rating coefficient was used to evaluate the correlation between average electrolyte level and maximum detrusor pressure during nighttime bladder storage.

Results

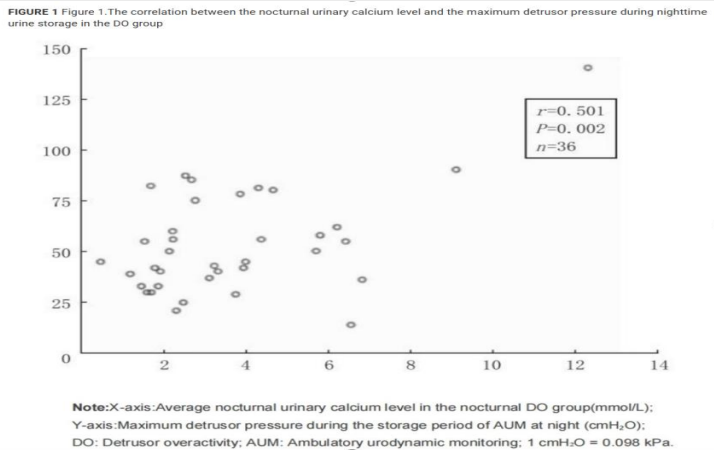


FIGURE 2 Table 1.Comparison of average urine electrolyte levels and urine volume between the non-nocturnal DO group and the nocturnal DO group

| Group | Cases | Daytime Urine Sodium | | Daytime Urine Potassium | | Daytime Urine Calcium | | Daytime Urine Chloride | | Nighttime Urine Volume [L, M (Q1, Q3)] |
|------------------------|-------|----------------------|---------------------|-------------------------|---------------------|-----------------------|---------------------|------------------------|--|--|
| | | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | | | |
| Non-nocturnal DO group | 24 | 130.96 ± 58.88 | 32.46 ± 26.96 | 2.02 ± 1.36 | 118.57 ± 57.31 | 0.420 (0.298, 0.673) | | | | |
| Nocturnal DO group | 36 | 132.48 ± 79.84 | 22.74 ± 13.66 | 1.48 ± 1.20 | 131.67 ± 70.03 | 0.291 (0.194, 0.408) | | | | |
| t/Z value | | 0.080 | -1.840 | -1.622 | 0.761 | -2.445 | | | | |
| P value | | 0.937 | 0.071 | 0.110 | 0.450 | 0.014 | | | | |

| Group | Cases | Nighttime Urine Sodium | | Nighttime Urine Potassium | | Nighttime Urine Calcium | | Nighttime Urine Chloride | |
|------------------------|-------|------------------------|---------------------|---------------------------|---------------------|-------------------------|---------------------|--------------------------|--|
| | | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | (mmol/L, mean ± SD) | | |
| Non-nocturnal DO group | 24 | 132.15 ± 67.42 | 25.39 ± 11.70 | 1.98 ± 2.07 | 110.95 ± 54.27 | | | | |
| Nocturnal DO group | 36 | 181.13 ± 102.39 | 28.76 ± 14.65 | 3.68 ± 2.44 | 147.89 ± 57.21 | | | | |
| t/Z value | | 2.061 | 0.944 | 2.802 | 2.501 | | | | |
| P value | | 0.044 | 0.349 | 0.007 | 0.015 | | | | |

FIGURE 3 Table 2.Comparison of daytime and nighttime urine electrolyte levels within the non-nocturnal DO group and the nocturnal DO group (mmol/L, mean ± SD)

| Group | Cases | Daytime | Nighttime | t value | P value |
|---------------------------|-------|----------------|-----------------|---------|---------|
| Non-nocturnal DO group 24 | | | | | |
| Sodium (mmol/L) | | 130.96 ± 58.88 | 132.15 ± 67.42 | -0.065 | 0.948 |
| Potassium (mmol/L) | | 32.46 ± 26.96 | 25.39 ± 11.70 | 1.178 | 0.245 |
| Calcium (mmol/L) | | 2.02 ± 1.36 | 1.98 ± 2.07 | 0.073 | 0.942 |
| Chloride (mmol/L) | | 118.57 ± 57.31 | 110.95 ± 54.27 | 0.473 | 0.638 |
| Nocturnal DO group 36 | | | | | |
| Sodium (mmol/L) | | 132.48 ± 79.84 | 181.13 ± 102.39 | -2.248 | 0.028 |
| Potassium (mmol/L) | | 22.74 ± 13.66 | 28.76 ± 14.65 | -1.803 | 0.076 |
| Calcium (mmol/L) | | 1.48 ± 1.20 | 3.68 ± 2.44 | -4.862 | <0.001 |
| Chloride (mmol/L) | | 131.67 ± 70.03 | 147.89 ± 57.21 | -1.323 | 0.190 |

Conclusions:The increased nocturnal urine sodium, calcium, and chloride levels in children with PMNE may be one of the important reasons for the occurrence of nocturnal bladder dysfunction.