Efficacy of Nondrug Lifestyle Measures for the Treatment of Nocturia

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Abbreviations and Acronyms

FVC = frequency volume chart

I-PSS = International Prostate Symptom Score

NBCi = nocturnal bladder capacity index

Ni = nocturia index

NPi = nocturnal polyuria index

NUV = nocturnal urine volume

PSQI = Pittsburgh Sleep Quality Index

QOL = quality of life

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Purpose: Nocturia has a major impact on quality of life and affects numerous aspects of health. Lifestyle modifications are expected to be helpful in improving nocturia. However, the efficacy of this strategy has not been established. We tested the efficacy of nondrug lifestyle measures as a first step in treating nocturia and found factors predictive of the efficacy of the intervention.

Materials and Methods: We conducted a prospective evaluation of 56 patients treated at 3 hospitals between 2005 and 2009 for symptomatic nocturia. The patients were advised to modify their lifestyle to improve nocturia. Lifestyle modifications consisted of 4 directives of 1) restriction of fluid intake, 2) refraining from excess hours in bed, 3) moderate daily exercise and 4) keeping warm in bed. The frequency volume chart, International Prostate Symptom Score, and Pittsburgh Sleep Quality Index before and 4 weeks after the intervention were used to evaluate the efficacy of the therapy.

Results: Mean nocturnal voids and nocturnal urine volume decreased significantly from 3.6 to 2.7 ($p < 0.0001$) and from 923 to 768 ml ($p = 0.0005$), respectively. Of the 56 patients 26 (53.1%) showed an improvement of more than 1 episode. This treatment was significantly more effective in patients with a larger 24-hour urine production.

Conclusions: Nondrug lifestyle measures were effective in decreasing the number of nocturia episodes and improving patient quality of life. Patients with polyuria showed a better response to the treatment.

Key Words: life style, behavior therapy, nocturia, quality of life

Nocturia has a major impact on quality of life, affecting numerous aspects of health, contributing to fatigue, memory deficits, depression, and increased risk of heart disease and gastrointestinal disorders.[1–4] Nocturnal or global polyuria, decreased nocturnal bladder capacity and sleep disturbance are the possible causes of nocturia.[5,6] Medical therapy with anticholinergic agents, desmopressin and time release diuretics is often considered the first line treatment depending on the diagnosis and underlying cause. However, medications have the potential risk of adverse events and cause problems with national medical expenditures as the number of patients increase due to the aging of the population. Lifestyle modifications such as fluid restriction and sleep enhancement are expected to be helpful but the effectiveness of this strategy has not been established.[1,2,7] We tested the efficacy of nondrug lifestyle measures as a first step in treating nocturia and found factors predictive of the efficacy of the intervention.

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MATERIALS AND METHODS

Of the patients who visited our outpatient clinic with a chief complaint of nocturia those with a nocturnal frequency of 2 or more voids were enrolled in the study. Exclusion criteria were post-void residual volume greater than 50 ml, untreated urogenital malignancies, or renal, cardiac or hepatic failure. Patients who strongly sought medical treatment were also excluded from analysis.

After completing a 72-hour FVC the patients were advised to modify their lifestyle to improve nocturia. Lifestyle modifications consisted of 4 directives of 1) restriction of fluid intake, 2) refraining from excess hours in bed, 3) moderate daily exercise and 4) keeping warm in bed. We were careful not to impose overly strict measures on the patients and gave them an explanatory brochure to aid their understanding of the procedure. In the brochure we said, "Examples of lifestyles that can be associated with nocturia are listed below. If you think one or more are applicable to you, please follow the appropriate recommendations." For fluid restriction we instructed the patients that a daily fluid intake of 2% of body weight (ie 1,000 ml for a person weighing 50 kg) is enough. We also told patients to restrict fluid particularly in the evening and to avoid excess alcohol or caffeine intake. In addition, we explained that the patients should not stay in bed for a long time and that excess bedtime hours would make their sleep shallower, leading to worsening of the nocturia. As an example of moderate daily exercise, we told the patients, "If you can walk, try to walk 20 minutes a day. Walking in the evening would be more effective." Finally we suggested taking a hot water bottle to bed as 1 of the methods to keep warm in bed.

The FVC, I-PSS,[8] and PSQI[9,10] before and 4 weeks after the intervention were used to evaluate the efficacy of the therapy. The Japanese versions of these questionnaires have been validated previously.[8,10] Outcomes were defined as excellent (nocturia decreased by 2 or more episodes nightly), improved (nocturia decreased by 1 or more episodes nightly) or unchanged. We offered further medical therapy to the nonresponders. The PSQI is a self-rated questionnaire for evaluating subjective sleep quality. The questions are combined to obtain a global score ranging from 0 to 21, with higher scores indicating worse sleep quality. A global score greater than 5 is considered to indicate a sleep disorder.[9]

Nocturnal urine volume was defined as the total volume of urine passed during the night including the first morning void.[11] Nighttime was defined as the period between going to bed with the intention of sleeping and waking with the intention of rising.[12] From the FVC variables the measurements were derived as described elsewhere, including NPi—the ratio of NUV-to-24-hour urine volume, Ni—a measure of nocturnal urine overproduction with a higher score indicating greater nocturnal urine overproduction, predicted number of nocturnal voids, and NBCi—reflective of nocturnal bladder capacity with a higher score suggesting decreased nocturnal bladder capacity.[13] The nighttime-to-daytime diuresis ratio was calculated as [NUV(ml) / nighttime (hours)] / [(24-hour urine volume – NUV) (ml) / (24 – nighttime) (hours)].

For statistical analyses a Wilcoxon signed rank test was used to compare repeated measurements of variables. Spearman correlation coefficients were used to examine the relationship between baseline parameters and the degree of improvement (change in nighttime frequency). Nominal data were analyzed using Fisher's exact test. Results were considered significant at $p < 0.05$. Statistical analysis was performed using GraphPad Prism®, version 5.

RESULTS

Data from 56 patients (47 men and 9 women) were evaluated. Mean ± SD age was 74.5 ± 5.7 years (range 59 to 85) and mean body mass index was 21.8 ± 3.2 kg/m^2 (range 15.0 to 30.9). Underlying medical disorders included hypertension (13 patients, 23.2%), diabetes mellitus (12, 21.4%), cardiac conditions (10, 17.9%) and sleep apnea (3, 5.4%). Medical prescriptions included alpha-blockers (13, 23.2%), cholinergics (2, 3.6%) and anticholinergics (10, 17.9%) for lower urinary tract symptoms, and diuretics (5, 8.9%) for cardiac conditions. We did not change the previously prescribed drugs but just added the lifestyle modifications.

Data from the FVC before and after the intervention showed significant objective improvement in the symptoms as shown in table 1. Mean nocturnal voids and NUV decreased from 3.6 ± 1.1 to 2.7 ± 1.2 ml ($p < 0.0001$) and from 923 ± 332 to 768 ± 339 ml ($p = 0.0005$), respectively (fig. 1). The percentage of patients with improved and excellent responses was 53.1% and 24.5%, respectively. The 24-hour frequency of micturition also decreased from 11.6 ± 2.6 to 10.7 ± 2.9 times ($p = 0.0065$). Analyses of the FVC derived variables revealed significant improvement in NPi, Ni and NBCi. The proportion of patients with normal NPi (less than 33%[12]) increased from 4% to 20%. The mean nighttime-to-daytime diuresis ratio decreased from 1.46 ± 0.38 to 1.32 ± 0.43 ($p = 0.0052$).

The patient reported mean number of nocturia episodes (I-PSS question 7) and I-PSS-QOL score decreased significantly after the intervention (table 2). In 31 of the 56 patients (54.4%) nocturia improved (decreased by 1 or more points). In 28 patients (50.0%) the I-PSS-QOL score improved by 1 or more points. There were no significant changes in the other scores (I-PSS 1 through 6) before and after the intervention. Analyses of the PSQI revealed that although the global score did not show a significant change, the sleep quality score significantly improved after the intervention. Of the nonresponders 52% (13 of 25) underwent medical therapy, which included anticholinergics, desmopressin, diuretics or nonsteroidal anti-inflammatory drugs. Other nonresponders continued the lifestyle modifications instead of taking medicine.