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Purpose: The aim of this study was to describe nocturia with or without leakage in a population of patients with multiple sclerosis.

Materials and Methods: This is a retrospective, single center study of 309 patients with multiple sclerosis who were followed at an experienced neurourology center between 2011 and 2013. All patients had daytime urinary symptoms associated with this disorder. Among the patients with nocturia 2 groups were defined, including those with isolated nocturia but without nocturnal urinary incontinence and patients with nocturia associated with nocturnal urinary incontinence. The control group comprised patients without nocturia. The clinical variables and urodynamic data studied were gender, age, EDSS (Expanded Disability Status Scale), the USP (Urinary Symptoms Profile) questionnaire overactive bladder score, bladder capacity, detrusor activity and volume at the first detrusor contraction.

**Results:** Of our patients 53.3% had nocturia, including 35.7% with nocturnal urinary incontinence. The average ± SD USP overactive bladder score was statistically greater in patients with nocturia than in controls ( $9.14 \pm 4.3$  vs  $5.1 \pm$ 3.5, p = 8.21E-17). Mean maximum cystometric capacity was statistically higher in the control group than in patients with nocturia (380.17  $\pm$  113.79 vs 313  $\pm$ 128.4 ml, p = 5.60E-6). A similar outcome was found for the first contraction (mean  $232.58 \pm 146.05$  vs  $181.14 \pm 100.11$  ml, p = 0.041).

Conclusion: Isolated nocturia or nocturnal urinary incontinence is a frequent problem encountered in multiple sclerosis. Our results suggest that an overactive detrusor is the main mechanism. Further studies are needed to verify the complications arising from nocturia.

Key Words: urinary bladder, overactive; multiple sclerosis; nocturia; cholinergic antagonists; sleep

Nocturia was defined by ICS as a complaint causing an individual to wake at least once per night to void.<sup>1</sup> The frequency of nocturia is difficult to assess since it is often included in OAB. It can be isolated or associated with leakage secondary to urge incontinence, with reduced warning

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time or secondary to enuresis with leakage during sleep.

Nocturia causes sleep disorders complications, numerous tiredness, drowsiness. including muscle stiffness and mood alterations.2 Thus, it affect patient quality of life.<sup>3</sup> In addition, it can potentially

## **Abbreviations** and Acronyms

ICS = International Continence Society

MS = multiple sclerosis

NUD = nocturnal urinary disorder

NUI = nocturnal urinary incontinence

OAB = overactive bladder

SUI = stress urinary incontinence

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 lead to the risk of falls, especially in this population with a high rate of motor disabilities.

Bladder disorders are a frequent problem for patients with MS.<sup>4</sup> Although many studies have been performed in an attempt to accurately evaluate the pathophysiology of the symptoms as well as various therapeutic options for such disorders, <sup>5,6</sup> most of them have focused on daytime urinary disorders. Conversely, although data concerning the influence of nocturia on sleep quality in patients with MS is available, no specific study has focused on the description and consequences of isolated nocturia and nocturia with NUI in MS.<sup>7</sup>

To evaluate the effects of NUD in patients with MS we distinguished between patients with nocturia and NUI, and patients with nocturia but without leakage (also called isolated nocturia) to gain a better understanding of the role of the factors potentially contributing to each of these disorders. These 2 groups were compared with a control group of patients with MS who had no nocturnal urinary symptoms.

The aim of our study was first to measure the prevalence of nocturia in patients with MS and then to determine the clinical and urodynamic conditions observed in 2 groups, that is patients with isolated nocturia and patients with NUI.

## **METHODS**

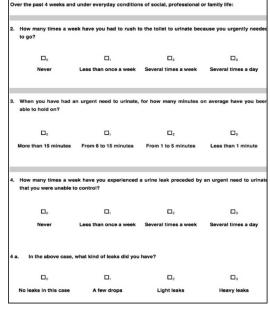
The study was designed to be retrospective and single center. It included patients selected from a database of 44,087 patients who were followed at an experienced neurourology center between 2011 and 2013. Study inclusion criteria were age greater than 18 years, USP total score<sup>8</sup> higher than 6 and MS defined according to the criteria of McDonald et al.<sup>9</sup> Exclusion criteria were associated urological disorders, including benign prostatic hypertrophia in male patients with a prostate volume greater than 30 cc on prostatic ultrasonography, greater than stage 2 prolapse in women and primitive enuresis (without toilet training since childhood).

USP is a self-questionnaire recommended by ICS. <sup>10</sup> It consists in 13 items covering all types of urinary disorders, including urinary incontinence, obstructive symptoms and OAB (fig. 1). A higher score corresponds [F1] to more severe symptoms. USP is composed of 3 components, including a SUI score, a OAB score and an obstruction symptoms score. For the OAB USP score 7 questions are devoted to defining the qualitative and quantitative conditions of OAB with questions 3 and 4 describing the more specific criteria of this syndrome as defined by ICS. <sup>1</sup>

The Kurtzke EDSS is a quantifying disability method to assess MS. A EDSS score between 1.0 and 4.5 refers to people with MS who are fully ambulatory. A EDSS score between 5.0 and 9.5 defines MS with varying degrees of impaired ambulation. In the context of our study it was important to distinguish between patients with a EDSS score of 6, who are able to walk with a cane, and those with a EDSS score of 7, who use a wheelchair.

The clinical factors studied were the age distribution and gender ratio in each group, the presence of OAB syndrome, the presence of obstruction symptoms (due to the questions designed to characterize each of them) and EDDS.

The main urodynamic factors studied were patient bladder capacity and volume at the first uninhibited



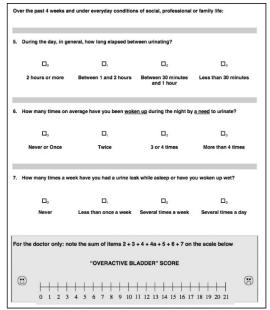


Figure 1. OAB score from USP questionnaire

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