

Clinical profile and lower urinary tract symptoms in patients with multiple sclerosis: a descriptive study from a tertiary care center in Mexico

Perfil clínico y síntomas del tracto urinario inferior en pacientes con esclerosis múltiple: estudio descriptivo en un centro de referencia en México

Ana S. Vidal-Brandt¹, Alejandro Rivera-Chairez², Blayne Welk³, Karina Villaseñor-Álvarez⁴,
Frida S. Teran-Amaya⁵, and Jorge Moreno-Palacios^{6*}

¹Department of Urology, Centro Médico ABC, Campus Santa Fe, Mexico City; ²Medicine Faculty, Universidad Autónoma de Coahuila, Unidad Torreón, Torreon, Coahuila; , Mexico; ³Division of Urology, Department of Surgery, Western University, Ontario, Canada; ⁴Department of Urology, Hospital Regional No.1 Charo Morelia, Morelia, Michoacan; ⁵Department of Urology; ⁶Division of Research. Unidad Médica de Alta Especialidad, Hospital de Especialidades Dr. Bernardo Sepúlveda Gutiérrez, Centro Médico Nacional Siglo XXI, Instituto Mexicano del Seguro Social, Mexico City. Mexico

Abstract

Background: Lower urinary tract symptoms (LUTS) are common in patients with multiple sclerosis (MS) and significantly impact quality of life. However, data describing urinary symptom profiles in Mexican populations remain limited. **Objectives:** The objective of the study was to describe the clinical characteristics and urinary symptom profile in patients with MS, including differences according to sex. **Material and methods:** A cross-sectional descriptive study was conducted in patients with MS and LUTS evaluated at a tertiary care center. Demographic and clinical variables, including age, sex, disease duration, expanded disability status scale (EDSS), and neurogenic bladder symptom score (NBSS), were collected. Urinary symptoms were analyzed descriptively, and comparisons according to sex were performed using non-parametric tests. **Results:** A total of 117 patients were included; 67% were women and 33% were men, with a median age of 40 years. The median NBSS total score was 18. Storage and voiding symptoms were the most frequently reported. Most patients (94%) reported spontaneous voiding. Female patients showed a higher symptom burden than males, with higher NBSS total scores (23 vs. 13; $p = 0.047$) and higher incontinence and consequences domain scores. A weak positive correlation between NBSS and EDSS was observed ($r = 0.27$; $p = 0.003$). **Conclusion:** LUTS are highly prevalent in MS and represent a significant clinical burden. Sex-related differences were observed, with greater symptom burden in women.

Keywords: Multiple sclerosis. Neurogenic lower urinary tract dysfunction. Lower urinary tract symptoms. Questionnaires.

Resumen

Antecedentes: Los síntomas del tracto urinario inferior (STUI) son frecuentes en pacientes con esclerosis múltiple (EM) y afectan de manera importante la calidad de vida. Sin embargo, existe información limitada sobre su perfil clínico en población mexicana. **Objetivo:** Describir las características clínicas y el perfil de síntomas urinarios en pacientes con EM. **Material y métodos:** Estudio transversal descriptivo en pacientes con EM evaluados en un centro de referencia. Se recolectaron variables demográficas y clínicas; edad, sexo, tiempo de evolución, EDSS y Neurogenic NBSS. Los síntomas

*Correspondence:

Jorge Moreno-Palacios
E-mail: jorgemorenomd@gmail.com

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urinarios se analizaron de manera descriptiva y se realizaron comparaciones por sexo mediante pruebas no paramétricas.

Resultados: Se incluyeron 117 pacientes, 67% mujeres y 33% hombres, con mediana de edad de 40 años. La mediana del NBSS total fue de 18 puntos. Los síntomas de almacenamiento y vaciamiento fueron los más frecuentes. El 94% reportó micción espontánea. Las mujeres presentaron mayor carga sintomática que los hombres, con mayor puntuación total (23 vs. 13; $p = 0.047$) y en los dominios de incontinencia y consecuencias. Se observó una correlación positiva débil entre NBSS y EDSS ($r = 0.27$; $p = 0.003$). **Conclusión:** Los STUI son altamente prevalentes en la EM y representan una carga clínica relevante. Se observaron diferencias según sexo, con mayor afectación en mujeres.

Palabras clave: Esclerosis múltiple. Disfunción neurogénica del tracto urinario. Síntomas de tracto urinario inferior. Cuestionarios.

Introduction

Multiple sclerosis (MS) is the most common chronic neuroinflammatory, demyelinating, and neurodegenerative disease of the central nervous system. It remains the leading cause of non-traumatic disability among young adults.¹

Globally, approximately 2.8 million people are affected by MS, which corresponds to about 1 in 3,000 individuals worldwide. In countries with the highest prevalence, up to 1 in every 300 people is affected. Most longitudinal studies within the same populations have shown an increase in the incidence of MS over time. This rise may be partially explained by greater public awareness, improved healthcare access, an increased number of MS specialists and magnetic resonance imaging scanners, as well as changes in diagnostic criteria.²

Epidemiological studies have shown an increasing prevalence of MS, with 13 cases/100,000 inhabitants reported in northern Mexico, although this figure applies only to the insured population. A multicenter study in Mexico demonstrated a female predominance, with a female-to-male ratio of 2:1.³

Neurogenic lower urinary tract dysfunction (NLUTD) is common in patients with MS. More than 75% of patients develop urinary symptoms in the course of the disease, over 90% experience urological symptoms 10 years after disease onset, and up to 8.7% present with lower urinary tract symptoms (LUTS) at the time of diagnosis.⁴⁻⁶

Any disruption of the neural pathways involved in lower urinary tract control may result in NLUTD. Patients with MS may present with storage symptoms (urgency and urgency urinary incontinence), voiding symptoms (voiding dysfunction), or a combination of both.⁷

Several instruments have been used to assess disability in MS, including the Expanded Disability Status Scale (EDSS).⁸ Similarly, Welk et al.,⁹ developed the Neurogenic Bladder Symptom Score (NBSS) to evaluate urinary symptoms in patients with neurological conditions.

The NBSS is a self-administered questionnaire originally developed for patients with spinal cord injury, MS, and spina bifida. It includes 22 items covering incontinence, storage and voiding symptoms, and urinary complications, as well as two items assessing bladder management and urinary-related quality of life. Responses are rated on 4- to 5-point ordinal scales.⁹ The EDSS, assigned by a neurologist, quantifies functional disability across eight domains and overall ambulation, and remains the most widely used scale to monitor MS progression.⁸

The Spanish version of the NBSS was validated by Moreno et al.,¹⁰ demonstrating strong psychometric properties (Cronbach's $\alpha = 0.86$, ICC = 0.91).

It remains unclear how frequently urinary symptoms are evaluated and treated during routine clinical care in patients with MS. As specialists often focus on the neurological aspects of the disease, LUTS may be underrecognized and therefore undertreated.⁶ In this context, the NBSS provides valuable information on urinary symptom burden and may facilitate communication between neurology and urology teams.

The aim of this study is to describe the profile of LUTS in patients with MS. Identifying the frequency and distribution of these symptoms, both overall and according to sex, in a reference center may contribute to a better characterization of this population, the recognition of unmet clinical needs, and the implementation of systematic urological evaluation.

Materials and methods

This was a prospective, single-center, observational, and cross-sectional study conducted at the Neurourology Clinic of the *Hospital de Especialidades Dr. Bernardo Sepúlveda (Instituto Mexicano del Seguro Social, Mexico City)* between March and October 2022. The study was approved by the local research ethics committee.

All consecutive patients with MS attending the neurology clinic and referred for LUTS were included, regardless of disease duration or time since diagnosis. Inclusion criteria were age ≥ 18 years, a confirmed neurological diagnosis of MS according to the 2017 McDonald criteria, and being in clinical remission, defined as the absence of relapses or new neurological symptoms for at least 3 months before inclusion.

Patients were excluded if they had an active urinary tract infection, were pregnant, or had non-neurogenic urological comorbidities (such as bladder or kidney stones, prior pelvic or urological surgery, or urological malignancy). In addition, patients with missing EDSS data or those who completed the NBSS questionnaire incorrectly or incompletely were excluded. As the NBSS is a self-administered questionnaire, incomplete responses may occur due to fatigue or cognitive limitations in patients with MS.

The EDSS score was obtained from each patient's medical record and had been assigned by a neurologist specialized in MS during the most recent clinical evaluation.

The primary objective of the study was to describe the frequency and profile of LUTS in a cohort of patients with MS using the NBSS questionnaire. Secondary objectives included evaluating patient-reported quality of life, describing functional status using the EDSS, and exploring the relationship between NBSS and EDSS scores.

Clinical records provided data on age, MS subtype, EDSS score, and time since diagnosis. Categorical variables were summarized as frequencies and percentages, while continuous variables were described using measures of central tendency according to their distribution. The relationship between NBSS and EDSS was assessed using Spearman's correlation coefficient.

Results

Study population

A total of 147 patients met the inclusion criteria; however, 30 were excluded: 16 due to incomplete or invalid responses on the NBSS questionnaire and 14 due to missing EDSS data in their medical records.

Among the 117 patients included in the final analysis, 39 (33%) were men, and 78 (67%) were women. The median age was 40 years (range: 18-78), and the median NBSS score was 18 (range: 3-50). The median EDSS score was 5 for the overall cohort, 6 for men, and 5 for women (Table 1).

Table 1. Demographic and neurological characteristics of the patients included in the study

Characteristic	(n = 117)
Sex, n (%)	
Male	39 (33)
Female	78 (67)
Age (years), median (IQR)	40 (60)
Multiple Sclerosis Variant, n (%)	
Relapsing-remitting	97 (83)
Primary progressive	3 (2)
Secondary progressive	17 (15)
EDSS (median)	5
Male	6
Female	5
Disease duration (months), median (IQR)	78 (42-144)
NBSS Total Score, median (IQR)	18 (10-28)
Incontinence domain	6 (0-11)
Storage and voiding domain	9 (0-13)
Consequences domain	3 (0-5)

IQR: interquartile range; EDSS: expanded disability status scale.

Urinary symptoms evaluated by NBSS

According to question 1, "Most of the time, how do you manage your bladder or urine function?" 94% of participants answered "By urinating in the toilet," 3% "With an indwelling catheter or stoma bag," 2% "With an intermittent catheter," and only 1% "With a condom-type urinary collector."

The NBSS median total score was 18 points, six points for incontinence, nine for storage and voiding, and three for consequences. In the female patients, the median for the total score was 23 points, seven points for incontinence, nine for storage and voiding, and four for consequences. In the male group, the median for the total score was 13 points, one point for incontinence, 10 for storage and voiding, and 0 for consequences (Table 2).

Question 24, which assesses quality of life "If you had to live the rest of your life with your bladder (or urinary reservoir) functioning as it currently does, how would you feel?" showed that 28% of patients reported feeling "Happy," 24% "mostly satisfied," 20% "mostly dissatisfied," 18% "equally satisfied and dissatisfied," and 9% "unhappy" (Table 2).

The association between sex and urinary symptoms was evaluated. Statistically significant differences were observed for the total NBSS score ($p = 0.047$), the incontinence domain ($p = 0.037$), and the consequences domain ($p = 0.001$), while no significant differences were found for the storage and voiding domain ($p = 0.98$).

Table 2. Low urinary tract symptoms in multiple sclerosis patients evaluated by NBSS

Domain	(n = 117)
Question 1. "Most of the time, how do you manage your bladder or urine function?, n (%)"	
By urinating in the toilet	110 (94)
With an indwelling catheter or stoma bag	4 (3)
With an intermittent catheter	2 (2)
With a condom-type urinary collector	1 (1)
NBSS Total Score, median (IQR)	18 (10-28)
Female	23 (11-29)
Male	13 (7-24)
Incontinence Domain (Q2-Q8, Q13), median (IQR)	6 (0-11)
Female	7 (0-12)
Male	1 (0-10)
Storage and Voiding Domain (Q9-Q12, Q15-Q17), median (IQR)	9 (6-13)
Female	9 (7-13)
Male	10 (6-14)
Consequences Domain (Q14, Q18-Q23)	3 (0-5)
Female	4 (1-7)
Male	0 (0-5)
Question 24. "If you had to live the rest of your life with your bladder (or urinary reservoir) functioning as it currently does, how would you feel?", n (%)"	
Happy	33 (28)
Mostly satisfied	28 (24)
Mostly dissatisfied	24 (20)
Equally satisfied and dissatisfied	21 (18)
Unhappy	11 (9)

IQR: interquartile range; Q: question; NBSS: neurogenic bladder symptoms score.

The Spearman correlation between the NBSS and EDSS was 0.274 ($p = 0.003$), indicating a weak but statistically significant positive correlation.

Discussion

In this study, we describe the clinical characteristics and urinary symptom profile of patients with MS evaluated in a neurourology clinic in Mexico. Our findings confirm that LUTS are highly prevalent in this population, with storage symptoms and urinary incontinence being the most frequently reported.

The predominance of female patients and the median age of approximately 40 years in our cohort align with previous reports in Mexican populations.^{3,4} Even among older adults with MS, Chesnel et al.¹¹ demonstrated that urinary symptoms remain prevalent and poorly tolerated, highlighting the importance of ongoing screening throughout the disease course.

Lower urinary tract dysfunction (LUTD) is a well-recognized complication of neurological diseases.^{1,3,4,6}

Several studies report a prevalence of LUTS ranging from 60% to 90% in MS patients, with storage symptoms and urgency urinary incontinence being the most frequent.^{12,13} In our cohort, most patients reported spontaneous voiding as their primary bladder management method; however, a considerable proportion exhibited a moderate to high urinary symptom burden according to NBSS scores. These findings highlight that significant symptoms may be present even in patients who do not require catheterization, supporting the need for systematic evaluation.

Ineichen et al., investigated the prevalence and consequences of LUTD in MS patients, emphasizing its detrimental effects on renal function and overall health. Their study found that nearly all severely disabled MS patients – up to 100% – experience LUTD, which can result in complications such as renal failure and increased mortality.¹⁴

Chesnel et al. reported that up to 78% of patients with MS develop LUTS during the course of the disease, with storage symptoms such as urgency and urinary incontinence being particularly common. Furthermore, they highlighted that understanding the clinical profile of urinary symptoms is essential for optimizing patient care, as LUTS may significantly affect quality of life, daily activities, and psychological well-being.¹¹

A relevant finding of this study was the difference in urinary symptom burden between sexes. Female patients exhibited higher overall NBSS scores, particularly in the incontinence and consequences domains, suggesting a greater perceived impact of urinary symptoms. In contrast, male patients showed a lower overall symptom burden, with similar storage and voiding scores between groups. These findings may reflect sex-related differences in symptom perception, pelvic floor function, or disease expression. Although the study was not designed to explore these mechanisms, the observed differences highlight the importance of considering sex as a relevant factor in the clinical assessment of urinary symptoms in MS.

The quality-of-life item revealed a heterogeneous perception of urinary symptoms, with a substantial proportion of patients reporting some degree of dissatisfaction. This finding underscores that even when patients maintain spontaneous voiding, urinary symptoms may significantly affect daily functioning and well-being. These findings are consistent with previous reports indicating that storage symptoms, particularly urgency urinary incontinence, are the most bothersome and have the greatest impact on quality of life in patients with MS. Ziadeh et al.¹⁵, demonstrated that storage

symptoms were significantly more impactful than voiding symptoms, with urgency urinary incontinence showing the strongest association with reduced urologic quality of life.

The NBSS and EDSS showed a statistically significant association, but the correlation strength was weak ($r = 0.27$). Although this pattern suggests that urinary symptoms tend to increase with neurological disability, the observed relationship was modest and should be interpreted cautiously, indicating that urinary symptom burden and neurological disability represent related but not interchangeable dimensions of disease.

Emerging functional neuroimaging data support a neuroanatomical basis for these clinical observations. Studies by Karmonik¹⁶ and Khavari et al.^{7,17}, have demonstrated alterations in brain connectivity patterns related to micturition initiation in MS patients with LUTD. Machine learning models built on these neuroimaging findings may help predict LUTS onset by integrating connectivity data, NBSS scores, and clinical parameters.

Multidisciplinary collaboration is essential in managing this population. Integration of neurologists, urologists, rehabilitation specialists, and specialized nursing care may help prevent urinary tract infections, preserve renal function, and enhance quality of life.^{18,19}

This study has several strengths, the inclusion of a well-characterized cohort from a specialized neurourology clinic and the use of a validated Spanish version of the NBSS, the cultural and linguistic validation of the NBSS in Spanish by Moreno-Palacios et al.¹⁰ and its high interobserver reliability, as shown by Welk et al.,⁷ support its use in Spanish-speaking populations. Nevertheless, certain limitations should be acknowledged. The cross-sectional design precludes causal inferences, and the absence of urodynamic data limits physiological correlation. The use of a self-administered questionnaire may also introduce recall bias, and the exclusion of patients with incomplete data may have contributed to selection bias.

The low proportion of patients performing intermittent catheterization (2%) likely reflects the inclusion of mostly ambulatory patients in remission, which may limit the generalizability of our results to individuals with more severe neurogenic bladder dysfunction.

Another limitation of the study to be taken into account is the lack of information on the management and follow-up of patients who presented LUTS, evaluated clinically and with the NBSS, after starting treatment for LUTS.

From a clinical perspective, our findings support systematic screening of urinary symptoms in patients with

MS. Because the study was cross-sectional and did not assess urinary management or longitudinal neurological change, NBSS values cannot be used to infer progression, treatment adequacy, or clinical thresholds.

Future research should focus on longitudinal evaluations of NBSS and EDSS evolution, the incorporation of functional neuroimaging biomarkers, and interventional studies testing whether NBSS-guided clinical algorithms can reduce renal complications and hospitalizations.

Conclusion

Urinary symptoms are highly prevalent in patients with MS and represent a significant component of clinical burden. In this cohort, differences in symptom profile were observed according to sex, with female patients showing a higher overall urinary symptom burden, particularly in incontinence and impact domains. The use of validated instruments such as the NBSS allows for a structured characterization of urinary symptoms and may support routine evaluation and multidisciplinary management. Further studies are needed to better understand the relationship between urinary symptoms, disability, and sex-related differences.

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Conflicts of interest

The authors declare no conflicts of interest.

Ethical considerations

Protection of human subjects and animals. The authors declare that no experiments on humans or animals were performed for this research.

Confidentiality, informed consent, and ethical approval. The authors have followed their institution's confidentiality protocols, obtained informed consent from all patients. This (approval no. R- study was approved by the IRB 2020-3601-064) on Month 05, 2020. SAGER guidelines have been followed as applicable to the nature of the study.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

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