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The effectiveness of gabapentin in treating overactive bladder: a quasi-experimental study

Malik Ayyad[1], Omar Ayaad[2*], Hassan Alkhatatbeh[3], Fadi Sawaqed[4], Samer Al-Rawashdeh[1], Bayan Qaddumi[5]

[1]Department of Urology Unit Special Surgery, Faculty of Medicine Mutah University Karak, Jordan
[2]Sultan Qaboos Comprehensive Cancer Care and Research Center, Muscat, Oman
[3]Department of General Surgery, Urology and Anaesthesia, Faculty of Medicine, Hashemite University, Zarqa, Jordan
[4]Department of Special Surgery, Faculty of Medicine, Mu'tah University, Karak, Jordan
[5]King Hussien Cancer Center, Amman, Jordan

***Correspondence to**
Omar Ayaad,
Email: o.ayaad@cccrc.gov.om

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Abstract

Introduction: Overactive bladder (OAB) is a common condition in urology that affects individuals of various ages and genders, significantly impacting their quality of life.
Objectives: The study aimed to examine the effectiveness of gabapentin in treating OAB in Jordan.
Patients and Methods: This study was conducted at a private clinic in Jordan between 2020 and 2022. It utilized a one-group pre- and post-test design involving 50 patients. The intervention involved administering gabapentin at a daily dose of 400 mg. The effectiveness of gabapentin was evaluated using the overactive bladder symptom score (OABSS) questionnaire, administered before and after six weeks of gabapentin administration.
Results: The study sample consisted of 50 patients aged between 45 and 85 years, with a mean age of 65.2 years. After the treatment, all individual variables, such as urgency, frequency, nocturia, and urgency incontinence, showed significant reductions compared to the pre-intervention values. The mean total OABSS significantly decreased from 14.6 before to 6.8 after the intervention. The paired t test yielded a result of 9.84 with a *P* value of less than 0.001, indicating a statistically significant improvement.
Conclusion: The noteworthy improvement in OABSS scores, urgency, nocturia, frequency of micturition, and urge incontinence observed in this study suggests that gabapentin could have a role as a treatment option for OAB patients.

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Introduction

Overactive bladder (OAB) is a well-known disorder in urology affecting individuals of any age and gender, substantially affecting a patient's life. OAB is a condition where a patient presents with urinary frequency, nocturia, and urgency, maybe also with urge incontinence, these may have substantial social, physical, and psychological effects later on (1). Several therapeutic modalities are available for OAB, including behavioral therapy, pharmacotherapy, and surgical interventions. Gabapentin, an anticonvulsant medication, has been proposed as a possible therapeutic option for OAB due to its ability to modulate and adjust the release of neurotransmitters in the central nervous system, including those involved in bladder function (2).

Several studies have investigated the effectiveness of gabapentin in treating OAB since 2017 (1-3). However, other studies have found no significant differences between gabapentin and placebo in OAB symptoms (3,4). These studies suggest that the efficacy of gabapentin in treating OAB remains controversial.

Gabapentin is believed to reduce the release of glutamate and substance P, which are involved in bladder hypersensitivity, reducing OAB symptoms (5). Gabapentin modulates the activity of the GABA neurotransmitter, leading to a reduction in detrusor overactivity (DO) and an increase in bladder capacity (2). This mechanism of action makes gabapentin a promising treatment option for OAB patients non-responsive to standard treatment, such as antimuscarinics.

Using gabapentin in OAB treatment has some advantages, such as the absence of anticholinergic side effects, which are common with antimuscarinics (4). Gabapentin is a well-tolerated medication; using it may have minimal side effects (2). These advantages make gabapentin a safe and effective alternative for OAB patients who are intolerant or have contraindications to antimuscarinics.

Key point

- Overactive bladder (OAB) is a known condition in urology that substantially impacts the quality of life of individuals across different age groups and genders.
- The study utilized a one-group pre and post-test design conducted at a private clinic in Jordan, involving a sample size of 50 patients who received a daily dose of 1200 mg of gabapentin.
- The results demonstrated a statistically significant reduction in the average overactive bladder symptom score (OABSS) following six weeks of gabapentin treatment.
- There was a significant decrease in mean scores for urgency, frequency, nocturia, and urgency incontinence.
- These findings suggest that gabapentin has the potential to be an effective treatment option for individuals with OAB, resulting in symptom improvement.

However, gabapentin use in OAB treatment is not yet widespread, therefore we still need more studies to determine its usefulness. Consequently, this study is performed to evaluate the effectiveness of gabapentin in treating OAB in a private clinic in Jordan using a one-group pre and post-test design. The study's findings will be helpful in decision-making regarding the use of gabapentin in the treatment of OAB and provide evidence for its efficacy and safety.

The importance of the study is in addition to the current knowledge on the effectiveness of gabapentin in treating OAB, especially in the Jordanian population. There are few studies about using gabapentin in OAB treatment in Middle Eastern countries, and this study can fill this gap. also, the study's findings can add to the previous studies about using gabapentin in OAB treatment, which clinicians may use in decision-making for the best therapeutic approach for their patients.

Objectives

Therefore, this study is to find and clarify the effectiveness of gabapentin in treating OAB in a private clinic in Jordan using a one-group pre and post-test design.

Patients and Methods

Study design

This quasi- experimental study was conducted in a private clinic in Jordan during 2020-2022. A one-group pre and post-test design was employed, where the same group of patients was measured before and after the intervention.

Sample

The patients included in the study consisted of patients who were diagnosed with OAB and attended a private clinic in Jordan. The sample included 50 patients who met the inclusion criteria: 18 years or above, diagnosed with OAB based on the International Continence Society (ICS) criteria, wanted to be included in the study, and were willing to give informed consent. Exclusion criteria included previous allergy to gabapentin or any of its components, pregnancy or lactation, and neurological or psychiatric conditions.

The ICS criteria is a set of guidelines for diagnosing OAB and other lower urinary tract dysfunctions. The ICS criteria are updated regularly and provide a standardized approach to assessing urinary symptoms and urodynamic testing (5).

Intervention

The intervention involved the administration of gabapentin to the patients. The dosage of gabapentin used to treat OAB can vary based on a patient's age, weight, and medical history. The dose is 1200 mg/d. Patients were followed up regularly during the six-week intervention period to assess the efficacy of the medication and monitor any adverse effects.

Tool to test effectiveness

The overactive bladder symptom score (OABSS) questionnaire was conducted to assess the effectiveness of gabapentin in treating OAB. The questionnaire was administered to the patients before and 6 weeks after the intervention.

The OABSS is a commonly used questionnaire to assess the severity of symptoms related to OAB. It is used to evaluate the effectiveness of interventions for OAB, such as medication or behavioral therapy. The OABSS includes four questions on urgency, frequency, nocturia, and urgency incontinence, each using a Likert scale of 0 to 5. A higher score indicates a more advanced condition. The OABSS is a reliable and valid tool for assessing OAB symptoms in various populations, including women, men, and the elderly (6,7).

Data collection methods

Face-to-face interviews, medical record reviews, and/or phone calls were used to collect the data and to follow up with the patients before and after the intervention period. A trained and blinded to the patient's treatment status research assistant collecting the data.

Statistical analysis

Descriptive statistics was conducted by SPSS (Statistical Package for the Social Sciences) version 25. Additionally, Analysis of variance (ANOVA) and paired *t* tests were conducted for analysis. Accordingly, a *P* value of less than 0.05 was considered statistically significant.

Results

Demographic data

The research involved a cohort of 50 patients diagnosed with OAB, and their demographic information was gathered for analysis. The age of the participants varied from 45 to 85 years, with an average age of 65.2 years. Among the 50 patients, 28 were female (56%) and 22 were male (44%). In terms of education level, 15 patients had a

college degree (30%), 20 had a high school degree (40%), and 15 had an elementary school education (30%). The employment status of the patients showed that 24 patients were retired (48%), 16 were employed full-time (32%), and 10 were unemployed (20%) (Table 1).

The majority of the patients were married, with 32 patients (64%) in this category, while 10 were single (20%), and 8 were divorced or widowed (16%). The income level of the patients varied, with 20 patients having a monthly salary of less than 1000 JD per month (40%), 20 having an income between 1000 and 2000 JD per month (40%), and 10 having a monthly salary of more than 2000 JD per month (20%).

Table 1. Demographic data of patients

Demographic characteristics	Count	Percent
Age range	45-85	-
Mean age	65.2	-
Gender		
Female	28	56
Male	22	44
Education level		
College degree	15	30
High school degree	20	40
Elementary school	15	30
Employment status		
Retired	24	48
Employed full-time	16	32
Unemployed	10	20
Marital status		
Married	32	64
Single	10	20
Divorced/Widowed	8	16
Income level		
< 1000 JD/month	20	40
1000-2000 JD/month	20	40
> 2000 JD/month	10	20
Comorbidities		
Hypertension	20	40
Diabetes	15	30
No comorbidities	10	20
Chronic kidney disease	5	10
Duration of OAB symptoms		
Range	6 months-10 years	-
Median	2	-
Concurrent therapy for OAB		
Taking antimuscarinic drugs	25	50
Not taking any OAB medications or urotherapy	25	50
Previous therapy		
Antimuscarinic drugs	15	30
Not taking any OAB medications	18	36
Mirabegron (beta 3 agonist)	12	24

Comorbidities were documented, and out of the total number of patients, 20 (40%) had hypertension, 15 (30%) had diabetes, 10 (20%) had no comorbidities, and 5 (10%) had chronic kidney disease. The time length for patients with symptoms of OAB ranged between 6 months to 10 years, with an average duration of 2 years.

In this study, the baseline characteristics of the patient population were evaluated concerning concurrent therapy for OAB and previous therapy for OAB. Out of the total patient population, 50% were taking antimuscarinic medication for OAB, while the other 50% were not taking any OAB medication or therapy. Regarding previous therapy, 30% of the patients had been treated with antimuscarinic drugs, while 36% had not received any OAB medication. Additionally, 24% had been treated with Mirabegron (beta 3 agonist), and 10% had undergone behavioral therapy and pelvic floor muscle exercises.

The findings from the study, as presented in Table 2, demonstrated a statistically significant improvement in the OABSS following the intervention. The mean values for all variables, including total score, urgency, frequency, nocturia, and urgency incontinence, significantly decreased post-intervention compared to pre-intervention. The mean value for total OABSS significantly decreased from 14.6 pre-intervention to 6.8 post-intervention with a paired T-test result of 9.84 and a P value of <0.001. This indicates that the intervention led to a significant improvement in overall OABSS.

The mean value for urgency significantly decreased from 3.3 to 1.4 post-intervention with a paired T-test result of 7.25 and a P value of <0.001. Similarly, the mean value for frequency significantly decreased from 3.7 to 1.7 post-intervention with a paired T-test result of 6.92 and a P value of <0.001. The mean value for nocturia significantly decreased from 2.0 to 0.8 post-intervention with a paired T-test result of 6.66 and a P value of <0.001. Finally, the mean value for urgency incontinence significantly decreased from 5.6 to 2.7 post-intervention with a paired t-test result of 9.21 and a P value of <0.001. The study's results suggest that gabapentin effectively improved the symptoms of an OAB in the study population.

The noteworthy enhancement observed in OABSS, frequency, urgency, nocturia, and urge incontinence after the intervention suggests the potential of gabapentin as a viable treatment choice for individuals with OAB. These findings promise to contribute to the formulation of updated treatment guidelines and enhance the quality of patient care in treating OAB.

The study findings indicated that combining gabapentin with antimuscarinic drugs as concurrent therapy led to a significantly lower mean OABSS score of 3.8 ± 0.9 compared to using gabapentin alone (5.2 ± 1.4) (t-test, $P < 0.001$). Furthermore, when gabapentin was used in

combination with previous therapy such as antimuscarinic drugs, Mirabegron and behavioral therapy and pelvic floor muscle exercises, it resulted in a significantly lower mean OABSS score of 4.2 ± 1.1 compared to using gabapentin alone (4.9 ± 1.2) (ANOVA, $P < 0.001$), especially when combined with antimuscarinic drugs (see Table 3).

Discussion

This research aimed to evaluate the effectiveness of gabapentin as a therapeutic option for OAB in a private clinic in Jordan. A quasi-experimental design with a one-group pre and post-test approach was employee. The OAB often coexists with conditions like hypertension, diabetes, and chronic kidney disease, impacting treatment outcomes. Studies have found that hypertension and diabetes were significantly associated with more severe OAB symptoms, whereas other comorbidities like depression and anxiety did not show a significant association. This highlights the importance of considering comorbidities when managing OAB (8). The duration of OAB symptoms observed in this study aligns with prior research, indicating that OAB is a chronic disorder significantly affecting patients' quality of life (9). Early intervention and appropriate management are crucial to mitigate the adverse effects of OAB on patients' lives.

It is worth noting that half of the participants in this study were not receiving any OAB medication, which is noteworthy as pharmacological treatment is commonly used in OAB management. Studies have demonstrated the effectiveness of antimuscarinic medications in alleviating OAB symptoms while emphasizing the need for personalized treatment plans that consider comorbidities and relevant factors (10). Considering comorbidities and the duration of OAB symptoms is vital in OAB management, and individualized treatment plans should be developed to address each patient's unique needs.

The study's findings align with previous research indicating that pharmacological interventions, including gabapentin, can effectively reduce OAB symptoms. For instance, one study found that treatment with antimuscarinic solifenacin significantly improved OABSS scores and individual symptom scores such as urgency, frequency, and incontinence (5). Another study demonstrated the effectiveness of mirabegron, a beta-3 agonist, in reducing OAB symptoms and improving the quality of life in OAB patients (11).

The significant decrease in OABSS scores, frequency, urgency, nocturia, and urge incontinence observed in this study is consistent with previous research showing that gabapentin is promising in reducing OAB symptoms. These symptoms are particularly bothersome and disruptive for patients with OAB and can significantly impact their quality of life and overall well-being (6,7). Therefore, finding effective treatments to reduce these symptoms is essential for improving patient care and quality of life.

The administration of gabapentin as a therapeutic drug for OAB is promising due to its unique mechanism of action, which involves the inhibition of excitatory neurotransmitters in the spinal cord and brainstem. This is different from the mechanism of action of antimuscarinic drugs, which act by blocking muscarinic receptors in

Table 2. The paired *t* test was conducted to compare the mean values of OABSS, urgency, frequency, nocturia, and urgency incontinence before and after the intervention

	Pre-intervention	Post-intervention	Paired t test	*P* value
Total score	14.6 (4.1)	6.8 (1.9)	9.84	<0.001
Urgency	3.3 (1.2)	1.4 (0.6)	7.25	<0.001
Frequency	3.7 (1.1)	1.7 (0.6)	6.92	<0.001
Nocturia	2.0 (0.9)	0.8 (0.3)	6.66	<0.001
Incontinence	5.6 (1.7)	2.7 (0.9)	9.21	<0.001

*The *P* value is considered significant at a threshold of less than 0.001.

Table 3. The differences in combining the gabapentin with concurrent therapy and previous therapy

Variable	Category	Sample size (n)	Mean OABSS Score	Standard deviation	Test type	*P* value
Concurrent therapy	Taking antimuscarinic	25	5.2	1.4	*t* test	<0.001
	Not Taking Any OAB Med or therapy	25	8.4	2.3		
Previous therapy	Antimuscarinic drug	15	4.9	1.2	Analysis of variance	<0.001
	Not taking any OAB Medications	18	8.2	1.8		
	Mirabegron	7	7.1	2.0		
	Beta-3 agonist	5	7.4	1.9		
	Pelvic floor muscle exercises, behavioral therapy	5	7.9	1.7		

*The *P* value is considered significant at a threshold of less than 0.001.

the bladder. This makes gabapentin a potentially useful therapeutic option for patients who do not tolerate or do not respond to antimuscarinic drugs.

Overall, this study suggests that gabapentin may be a viable therapeutic option for patients with OAB, especially those who have not responded to or cannot tolerate other pharmacological interventions, such as antimuscarinic drugs. However, more research is needed to establish its efficacy, confirm these findings, and determine the optimal dosage and duration of gabapentin treatment for OAB patients.

The study also highlights the critical role of antimuscarinic drugs in decreasing OAB symptoms in patients, regardless of whether they were administered as concurrent or previous therapy. These findings are consistent with previous studies, which have shown antimuscarinic drugs to effectively reduce urinary storage symptoms in patients with OAB (7,11). However, concerns about antimuscarinic drugs' long-term efficacy and safety remain, as some studies have reported adverse effects such as dry mouth, constipation, and cognitive symptoms (10,11). Further investigation is needed, especially in vulnerable populations like older adults or those with cognitive impairments.

The study provides valuable insights into the potential effectiveness of combining gabapentin with antimuscarinic drugs as concurrent or previous therapy for OAB treatment. The finding that combining gabapentin with antimuscarinic drugs as concurrent therapy resulted in a significantly lower mean OABSS score than using gabapentin alone is consistent with previous studies (12,13). This suggests that combining gabapentin with other previous therapies, particularly in conjunction with antimuscarinic drugs, may be a more effective treatment approach for OAB symptoms than using gabapentin alone. These findings have important clinical implications for OAB treatment and highlight the potential benefits of combining medications with different mechanisms of action to improve treatment outcomes.

In addition to medication, a total management approach to the therapeutic approach of OAB is essential based on studies including patient-centered care, quality improvement, communication and collaboration, user feedback, and satisfaction (14-17).

Conclusion

The notable improvement in OABSS scores, urgency, frequency, nocturia, and urge incontinence observed in this study indicates that gabapentin shows promise as a therapeutic option for individuals with OAB. However, further research is necessary to confirm these findings and determine the best dosage and duration of gabapentin treatment. Non-pharmacological interventions such as pelvic floor muscle training and behavioral therapy have also shown promise in reducing OAB symptoms and improving the quality of life in OAB patients. A multidisciplinary approach to OAB management should be considered, incorporating pharmacological and non-pharmacological interventions tailored to each patient's specific needs and preferences.

Limitations of the study

Several limitations need consideration in this study. Using a one-group pre and post-test design may not provide the most robust evaluation of treatment efficacy. The absence of a control group makes it challenging to determine if the observed improvements in OAB symptoms are specifically due to gabapentin treatment or influenced by other factors like placebo effects or natural symptom progression over time. Additionally, the study was conducted solely at a single private clinic in Jordan, which may limit the generalizability of the findings to other populations or clinical settings. The patient population at this clinic may not fully represent the broader spectrum of individuals with OAB, and treatment approaches and practices could differ across various clinics or hospitals. The relatively small sample size may reduce the statistical power of the analyses and increase the risk of type I and type II errors, hindering the ability to detect differences in treatment efficacy among different patient subgroups or explore potential predictors of treatment response.

Lastly, the study did not include a long-term follow-up period to assess the sustainability of treatment effects or the potential emergence of adverse effects associated with gabapentin over time. Future studies with larger sample sizes, extended follow-up periods, and more rigorous study designs are warranted to investigate further the efficacy and safety of gabapentin in OAB treatment.

Authors' contribution

Conceptualization: Malik Ayyad.
Data curation: Malik Ayyad.
Formal analysis: Malik Ayyad, Omar Ayaad.
Investigation: Malik Ayyad, Hassan Alkhatatbeh, Fadi Sawaqed, Samer Al-Rawashdeh.
Methodology: Malik Ayyad, Omar Ayaad, Hassan Alkhatatbeh, Fadi Sawaqed, Samer Al-Rawashdeh.
Project administration: Malik Ayyad.
Resources: Malik Ayyad.
Supervision: Malik Ayyad.
Validation: Hassan Alkhatatbeh.
Visualization: Malik Ayyad, Omar Ayaad.
Writing-original draft: Malik Ayyad, Omar Ayaad.
Writing-review & editing: Malik Ayyad, Omar Ayaad, Hassan Alkhatatbeh, Fadi Sawaqed, Samer Al-Rawashdeh, Bayan Qaddumi.

Conflicts of interest

The authors declare that they have no competing interests.

Ethical issues

The research adhered to the principles of the Declaration of Helsinki. The study received approval from the Ethics Committee of Mutah University of Medical Sciences. Written informed consent was obtained from all participants prior to any interventions. Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

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