

## Physician Knowledge and Practices Regarding the Use of Muscle Relaxants in the Management of Neuromuscular Disorders: A Multicenter Study

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### Abstract:

**Objective:** The aim of this study was to evaluate physician knowledge and practices regarding the use of muscle relaxants in the management of neuromuscular disorders (NMDs) in Yemen. The study also assessed factors such as familiarity with different muscle relaxants, comfort in their selection, awareness of contraindications, and perceptions regarding the role of muscle relaxants in patient management.

**Methods:** A cross-sectional survey was administered to 100 physicians working in both public and private hospitals in Yemen. The survey focused on physicians' knowledge, attitudes, and practices related to the use of muscle relaxants in treating NMDs.

**Results:** Results showed that while most physicians were familiar with different types of muscle relaxants (67%) and their mechanisms of action (64%), a notable proportion remained neutral or disagreed, indicating knowledge gaps. 76% of physicians felt comfortable selecting muscle relaxants, and 91% recognized their value in neuromuscular disorder management, though only 66% reported frequent clinical use. Regarding patient safety, 75% closely monitored for side effects, but only 58% believed patients fully understood the risks and benefits. Interest in further education was high, with 92% expressing a desire to participate in educational programs, and 91% emphasizing the need for further research to improve muscle relaxant safety and efficacy. These findings highlight the need for enhanced physician education and patient communication to optimize muscle relaxant use in clinical practice. Overall, the physicians reported moderate to high levels of familiarity and comfort in using muscle relaxants for NMDs, with 67% agreeing that muscle relaxants are valuable for managing symptoms. However, the study also identified gaps in knowledge regarding mechanisms of action and

side effects, with 36% of physicians unsure about contraindications for muscle relaxants in certain NMDs.

**Conclusion:** While physicians in Yemen generally recognize the value of muscle relaxants for NMD management, there is a need for increased education regarding their mechanisms, side effects, and contraindications. Further research and educational initiatives are essential to improve clinical practices.

**Keywords:** Physician Knowledge , Muscle relaxants , Neuromancer Disorder , Aden , Yemen

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## INTRODUCTION

Neuromuscular disorders (NMDs) encompass a wide range of conditions affecting the nervous system's ability to control muscles (Mary, P., Servais, L., & Vialle, R. (2018). These disorders can result from damage to the peripheral nervous system, spinal cord, or brain, leading to muscle weakness, spasticity, and other debilitating symptoms. Common NMDs include conditions such as multiple sclerosis, amyotrophic lateral sclerosis (ALS), muscular dystrophy, and spinal cord injury (Gomez Limia et al.2022). These disorders often lead to significant disability and a reduced quality of life for affected individuals (Gomez Limia et al.2022).

Among the various therapeutic approaches used to manage NMDs, muscle relaxants are frequently prescribed to alleviate symptoms such as muscle spasticity, cramps, and pain Meleger, A. L. (2006). Muscle relaxants can be broadly categorized into two groups: centrally acting agents, which target the central nervous system, and peripherally acting agents, which act directly on muscle fibers (Tattersall, J. (2016). Medications such as baclofen, tizanidine, and diazepam are commonly used to manage spasticity in NMDs, while others like dantrolene are used for more severe cases (Jones, V. T., & Christensen, W. (2020). Despite their widespread use, the appropriate selection and management of these medications can be complex due to the diverse mechanisms of action, side effects, and contraindications associated with different agents (Wells, B. G. (2009).

While muscle relaxants can offer significant relief, their use in clinical practice is not without challenges (van Tulder, M. W et al.,1996). The effectiveness and safety of these medications depend not only on the physician's understanding of the pharmacology of these drugs but also on careful consideration of individual patient factors such as comorbidities, other medications, and potential drug interactions (Juurlink, D. N et al.,2003). Additionally, certain NMDs may present unique contraindications for specific muscle relaxants, further complicating their use (Bhat, A., Dean, J., & Aboussouan, L. S. (2024).

The side effects of muscle relaxants, such as sedation, dizziness, and the potential for addiction, are another critical aspect that must be carefully managed (Beebe, F. Aet al.,2005). Physicians must be aware of these risks, monitor patients closely, and adjust treatment protocols accordingly ( Acker, C. G., et al.1998) . However, studies have suggested that physician knowledge of muscle relaxant pharmacology, side effects, and patient monitoring practices is often suboptimal, potentially leading to inappropriate prescribing and management (Kumar, R. S. (2024).

In Yemen, as in many low- and middle-income countries, the management of NMDs presents additional challenges. Limited access to resources, diagnostic facilities, and the availability of certain medications may influence treatment choices. There is limited research on the specific practices and knowledge of physicians in Yemen regarding the use of muscle relaxants in NMD management. Given the unique healthcare environment in Yemen—where there are disparities in medical education, access to

continuous professional development, and exposure to evidence-based treatment guidelines—it is essential to understand how these factors shape clinical practices.

This study aims to assess physician knowledge, attitudes, and practices concerning the use of muscle relaxants in the management of NMDs in Yemen. By exploring physician familiarity with different muscle relaxants, their understanding of their mechanisms and side effects, and their approach to patient education and monitoring, the study aims to identify areas for improvement in clinical practice. Furthermore, it seeks to determine the physicians' interest in further education and research to enhance their clinical decision-making and improve patient outcomes.

The primary objective of this study is to evaluate the level of physician knowledge and the frequency of muscle relaxant use in the management of NMDs. We also aim to examine how factors such as specialty, experience, and available resources influence the prescribing practices and management of these medications. Finally, this study will assess the need for continued professional development, with a focus on muscle relaxant therapy, in order to better support physicians in their clinical practices.

## **METHODS**

This study utilized a cross-sectional design to assess physician knowledge, attitudes, and practices regarding the use of muscle relaxants in the management of neuromuscular disorders (NMDs) in Yemen. The study was conducted across both public and private hospitals, aiming to collect data from physicians with varying levels of experience and specialties involved in NMD care.

### ***Inclusion Criteria:***

Physicians included in the study met the following criteria:

- License to practice medicine in Yemen.
- Currently practicing in hospitals that treat patients with neuromuscular disorders.
- Involvement in the management of patients with NMDs in a clinical setting (including general practitioners, neurologists, rehabilitation specialists, anesthesiologists, and other specialists).
- Willingness to participate in the survey and provide informed consent.

### ***Exclusion Criteria:***

Physicians were excluded from the study if:

- They were not actively involved in the treatment of patients with neuromuscular disorders.
- They were trainees or interns who did not yet have direct patient care responsibilities.
- They declined to participate or did not provide informed consent.

## Sample Size Calculation

The sample size for this study was determined using Cochran's formula for sample size calculation in cross-sectional studies. The formula is as follows:

$$n = Z^2 \times p \times (1-p) / E^2$$

Where:

- $n$  = required sample size.
- $Z$  = Z-value for the 95% confidence level (1.96).
- $p$  = estimated proportion of the population. Since no prior data was available for this specific population, a conservative estimate of  $p = 0.5$  was used to ensure maximum variability.
- $E$  = margin of error (0.1 or 10%).

Substituting the values into the formula:

$$n = (1.96)^2 \times 0.5 \times (1-0.5) / (0.1)^2$$
$$n = 3.8416 \times 0.5 \times 0.5 / 0.01 = 0.9604 / 0.01 = 96.04$$

Thus, the minimum required sample size was calculated to be 96.04. To account for potential non-responses and incomplete data, the sample size was rounded up to 100 participants. This target was successfully achieved in the study, ensuring sufficient statistical power for the analysis.

This approach ensured that the study had a representative sample size, allowing for reliable and generalizable results within a 95% confidence level and a 10% margin of error.

## *Ethical Approval:*

This study was approved by the Research Ethics Committee of University of Science and Technology Aden Yemen number MEC/AD056 and all participants provided written informed consent prior to participation. The study adhered to ethical guidelines for research involving human subjects, including ensuring confidentiality of responses, voluntary participation, and the right to withdraw from the study at any time without consequence.

Ethical considerations included:

- **Informed consent:** All participants were informed about the study's purpose, the voluntary nature of their participation, and the anonymity of their responses.
- **Confidentiality:** Personal and professional identifiers were removed from the collected data to ensure participant anonymity.
- **Data security:** Survey data were securely stored, with access limited to the research team.

## *Data Collection Procedures:*

Data collection was conducted over a 3-month period (from January to March 2024). A **structured questionnaire** was used to gather information from the participants. The steps in the data collection process were as follows:

1. **Survey Development:** A questionnaire was designed to assess physician knowledge, attitudes, and practices related to the use of muscle relaxants in NMDs. The survey included 14 Likert scale questions across several domains, including familiarity with muscle relaxants, comfort in using them, awareness of contraindications, and interest in further education.
2. **Survey Distribution:** The survey was distributed through both electronic and **paper-based** formats to accommodate physicians' preferences. Electronic surveys were sent via email to participating physicians, with an online survey platform (e.g., Google Forms or SurveyMonkey) used to collect responses. Paper-based surveys were distributed directly to physicians at their workplaces (hospitals), with the research team providing instructions and support when necessary.
3. **Survey Completion:** Physicians were asked to complete the survey within two weeks of receiving it. Follow-up reminders were sent to non-respondents after one week to maximize response rates.

**Data Entry and Management:** Once the surveys were collected, the responses were entered into a **secure database** for analysis. Any incomplete or unclear responses were reviewed by the research team, and participants were contacted for clarification if necessary.

**Quality Control:** To ensure the accuracy and reliability of the data, the research team performed a thorough review of all responses before data analysis. A random sample of 10% of the surveys was double-checked for consistency, and discrepancies were resolved.

## Statistical Analysis:

The survey responses were analyzed using descriptive statistics to summarize the demographic characteristics of the participants and their responses to each question. Percentages were calculated for each response category (Strongly Agree, Agree, Neutral, Disagree).

## RESULTS

### *Physician Demographics:*

The 100 participating physicians included:

- 40 neurologists
- 30 general practitioners
- 20 rehabilitation specialists
- 10 anesthesiologists

The majority (60%) had more than 5 years of experience in treating NMDs.

## *Physician Familiarity with Muscle Relaxants*

The majority of physicians (67%-68%) report being familiar with different types of muscle relaxants, their mechanisms of action, and contraindications, though a notable proportion remain neutral (22%-26%) or disagree (7%-11%), indicating some gaps in knowledge ( Table 1 ) .

**Table 1:** *Physician Familiarity with Muscle Relaxants* n= 100

Question	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)
Q1. Familiar with different types of muscle relaxants	27%	40%	22%	11%
Q2. Understand the mechanisms of action and side effects	25%	39%	26%	10%
Q3. Aware of considerations and contraindications for using muscle relaxants	31%	37%	25%	7%

## *Comfort and Confidence in Using Muscle Relaxants*

Most physicians (**76%**) feel comfortable selecting muscle relaxants, and **91%** believe they are valuable in treating neuromuscular disorders. However, fewer physicians (**66%**) report frequent use in clinical practice, suggesting some hesitation in prescribing them regularly (Table 2) .

**Table 2:** *Comfort and Confidence in Using Muscle Relaxants* n= 100

Question	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)
Q4. Comfortable selecting the appropriate muscle relaxant for a patient	33%	43%	17%	7%
Q5. Muscle relaxants are valuable in managing symptoms of neuromuscular disorders	24%	67%	4%	5%
Q6. Frequently use muscle relaxants in clinical practice	17%	49%	23%	11%

## *Approach to Non-Pharmacological Treatments and Patient Monitoring*

While many physicians (**61%**) consider non-pharmacological treatments first, a significant portion (**29%**) remain neutral. Monitoring for side effects is a strong priority (**75%**), and most are comfortable discussing risks and benefits (**74%**). However, fewer (**58%**) believe patients truly understand these risks, indicating a potential communication gap ( Table 3 ) .

**Table 3:** Approach to Non-Pharmacological Treatments and Patient Monitoring n=100

Question	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)
Q7. Consider non-pharmacological interventions before using muscle relaxants	17%	44%	29%	10%
Q8. Closely monitor patients for side effects when using muscle relaxants	31%	44%	19%	6%
Q9. Comfortable discussing risks and benefits of muscle relaxants with patients	27%	47%	21%	5%
Q10. Believe patients understand the risks and benefits of muscle relaxants	27%	31%	23%	19%

### Resources and Interest in Education

While **69%** feel they have adequate resources to stay updated, confidence in managing complications is slightly lower (**72%**). Strong consensus (**91%**) exists on the need for further research, and a similar percentage show interest in **educational programs (92%)**, highlighting a demand for ongoing learning in this area ( Table 4).

**Table 4:** Resources and Interest in Education n=100

Question	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)
Q11. Adequate resources to stay updated on muscle relaxants	31%	38%	21%	10%
Q12. Confident in managing complications associated with muscle relaxants	29%	43%	20%	8%
Q13. Further research needed to develop safer and more effective muscle relaxants	44%	47%	8%	1%
Q14. Interested in participating in educational programs on muscle relaxants	44%	48%	7%	1%

### DISCUSSION:

The data indicates that while Yemeni physicians acknowledge the therapeutic value of muscle relaxants for managing neuromuscular disorders, their understanding of the pharmacological mechanisms, side effects, and contraindications is somewhat limited. This gap in knowledge could affect clinical decision-making and patient safety. The relatively low frequency of muscle relaxant use despite recognition of their value (67% agree on their usefulness) may suggest that other factors, such as treatment protocols, patient preferences, or alternative therapies, influence clinical practice.

Physicians generally express confidence in discussing muscle relaxants with patients, but there is a notable disconnect between the physician’s understanding of the risks and the perception that patients fully comprehend them, as indicated by the 19% of respondents who disagreed with the statement that patients understand the risks.



Several studies have shown similar patterns of physician knowledge gaps regarding muscle relaxants. A 2002 study conducted in Canada found that while healthcare professionals were generally aware of muscle relaxant types and their uses, many lacked a deep understanding of their adverse effects and contraindications (Murray, M. J et al., 2002). Similarly, studies in Sirilanka and India have reported that while physicians are comfortable using muscle relaxants in routine practice, they often overestimate their efficacy and fail to adequately educate patients about potential side effects (Karunaratna, I., & Tharayil, A. S. (2024).

What differentiates this study from others is the high percentage of Yemeni physicians (91%) who expressed a need for further research to develop safer and more effective muscle relaxants. This suggests a greater awareness of limitations in current clinical practice, possibly due to resource constraints in Yemen. Additionally, the frequency of muscle relaxant use (66% report using them frequently) contrasts with studies from more developed healthcare systems, where use is generally higher despite similar knowledge gaps.

### *Limitations*

This study is subject to several limitations. The sample size of 100 physicians, though adequate for descriptive analysis, may not be fully representative of the physician population in Yemen. Furthermore, the reliance on self-reported data may lead to social desirability bias, where respondents may overstate their knowledge or practices.

### *Future Directions*

Given the high interest in educational initiatives (92% of respondents expressed interest in further training), it is essential to develop targeted educational programs focusing on muscle relaxant pharmacology, patient education, and monitoring strategies. Further research should explore the clinical factors influencing the low frequency of muscle relaxant use despite physician comfort with their

## CONCLUSION

This multicenter study evaluated the knowledge, attitudes, and practices of physicians regarding the use of muscle relaxants in the management of neuromuscular disorders (NMDs) in Yemen. The findings indicate that while physicians generally recognize the value of muscle relaxants for symptom management in NMDs, there are notable gaps in their understanding of the pharmacological mechanisms, side effects, and contraindications associated with these medications. A significant proportion of respondents expressed confidence in their ability to prescribe muscle relaxants and monitor patients for potential side effects, yet there was a clear need for further education on these medications, particularly in relation to the most appropriate use and potential complications.

Several key insights emerged from the study:

- **Physician Familiarity:** While a majority of physicians reported being familiar with the different types of muscle relaxants, fewer were confident in their understanding of the mechanisms of action and potential side effects.
- **Clinical Practices:** Although most physicians agreed that muscle relaxants are valuable in treating NMD symptoms, their actual use in clinical practice was less frequent, suggesting that other factors—such as treatment protocols, patient preferences, or alternative therapies—may influence prescribing behavior.



- **Need for Education:** A high percentage of physicians (92%) expressed interest in further education on muscle relaxant therapy, highlighting a willingness to improve knowledge and skills in this area.
- **Research Gaps:** A significant number of physicians believed that further research is needed to develop safer and more effective muscle relaxants, indicating a shared understanding of the limitations in current treatment options.

This study emphasizes the importance of addressing the knowledge gaps and barriers to effective use of muscle relaxants in the management of NMDs. Educational interventions targeted at improving physicians' understanding of pharmacology, side effect management, and patient monitoring are essential. Additionally, more research is needed to identify the most effective muscle relaxants for various NMDs and to optimize treatment protocols in low-resource settings like Yemen.

Given the relatively low use of muscle relaxants in practice despite high recognition of their value, future studies should explore the reasons behind this discrepancy, including potential barriers such as patient safety concerns, accessibility to medications, and clinical guidelines. Moreover, addressing these knowledge and practice gaps through continuous medical education and clinical guidelines could contribute to better patient outcomes and more effective management of neuromuscular disorders in Yemen.

## Disclaimer

The article has not been previously presented or published, and is not part of a thesis project.

## Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript

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