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Efficacy of Metaxalone vs. Chlorzoxazone in Treating Musculoskeletal Pain: A Comparative Study

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ABSTRACT

Musculoskeletal pain, prevalent globally, often requires effective pharmacological intervention. This study compares Metaxalone and Chlorzoxazone, two commonly prescribed muscle relaxants, to ascertain their efficacy and safety profiles. This study aimed to compare the efficacy and safety of Metaxalone and Chlorzoxazone in patients suffering from musculoskeletal pain. Pain intensity levels were evaluated before and after the treatment period. The ability of the medications to improve daily functional activities was also assessed. Side effect profiles of both medications were monitored and reported. Pain intensity: Initial assessments showed patients in the Metaxalone group had an average pain score of 8.5, which decreased to 1.7 post-treatment, reflecting a mean reduction of 6.8 points. In contrast, the Chlorzoxazone group started with an average pain score of 8.4, decreasing to 2.5 post-treatment, with a mean reduction of 5.9 points. The additional 0.9 point reduction in the Metaxalone group was statistically significant ($p = 0.043$). Functional impairment: 92% of patients in the Metaxalone group (46/50) reported significant improvements in daily activities post-treatment. In comparison, 78% of patients in the Chlorzoxazone group (39/50) experienced improved daily functions. Side effects: Only 10% of patients (5/50) treated with Metaxalone reported mild side effects, while 18% (9/50) of those treated with Chlorzoxazone experienced mild adverse effects. While both Metaxalone and Chlorzoxazone are effective in alleviating musculoskeletal pain, Metaxalone exhibited marginally superior efficacy and a slightly better side effect profile. As such, Metaxalone may be considered a preferable option for patients seeking both pain relief and enhanced quality of daily living with fewer side effects.

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Key Words
Musculoskeletal pain, metaxalone, chlorzoxazone, efficacy, safety profile, muscle relaxants, pharmacological intervention

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INTRODUCTION

Musculoskeletal pain, a pervasive medical issue affecting millions worldwide, encompasses a spectrum of disorders related to muscles, bones, tendons, ligaments and nerves[1]. It can be acute, following trauma like a fracture or sprain, or it can be chronic, as seen in conditions like osteoarthritis or chronic low back pain. Its impact on an individual's quality of life is profound, often hindering daily activities and tasks, leading to impaired functionality and increased dependency[2].

Over the years, research has pivoted towards understanding the underlying causes of musculoskeletal pain and discovering methods to manage and alleviate it[3]. While non-pharmacological methods like physical therapy and lifestyle modifications play a significant role, the importance of pharmacological interventions cannot be understated[4]. Often, these are the first line of treatment, providing immediate relief and facilitating other therapeutic methods[5].

Among the myriad of pharmaceutical options available, muscle relaxants occupy a significant position, especially for pain originating from muscular spasms or tension. Muscle relaxants, a diverse group of drugs with varying mechanisms of action, offer a respite by reducing muscle spasm, improving range of motion and decreasing pain perception[6,7]. However, as with all medications, their effectiveness varies among individuals and their safety profiles differ.

Two such muscle relaxants that have gained traction in the clinical community are Metaxalone and Chlorzoxazone[8,9]. Both drugs, while belonging to the same overarching category, have distinct pharmacological profiles and mechanisms of action. Metaxalone, a centrally acting muscle relaxant, is thought to work by inhibiting central nervous system functions, though its exact mechanism remains unknown. On the other hand, Chlorzoxazone acts primarily at the spinal cord and subcortical areas of the brain, where it inhibits multi-synaptic reflex arcs[10].

While individual studies have shed light on the efficacy and safety of both these drugs, direct comparisons are sparse. Such comparisons are vital to discern subtle differences that can guide clinicians in making informed prescription choices. As the medical community moves towards evidence-based practices, such comparative analyses can make a marked difference in patient outcomes. By understanding which drug offers better pain relief or has a milder side effect profile, clinicians can tailor their treatment strategies to individual patient needs.

Furthermore, with the rising costs of healthcare, it is pivotal to understand not just the clinical but also the economic implications of drug choices. Does one drug, despite being slightly more effective, lead to more frequent doctor visits due to side effects? Or is there a clear winner when considering both efficacy and safety?

It is against this backdrop that we felt the need for a head-to-head comparison of Metaxalone and Chlorzoxazone, two prominent muscle relaxants. This study seeks to fill the knowledge gap, providing insights that can have tangible clinical implications.

The primary aim of this study is to conduct a comparative analysis of the efficacy of Metaxalone and Chlorzoxazone in the management of musculoskeletal pain. The study's objectives encompass evaluating changes in pain intensity before and after treatment with each drug, assessing the influence of both medications on patients' daily functional activities and meticulously monitoring and reporting the side effect profiles of Metaxalone and Chlorzoxazone to determine their safety profiles within the study population.

MATERIALS AND METHODS

Study design and setting: This study adopted a comparative and observational approach, aiming to assess the relative effectiveness and safety of Metaxalone and Chlorzoxazone in the management of musculoskeletal pain. The study was conducted at Government Medical College, Suryapet, Telangana, providing a controlled and well-equipped medical setting for the research.

Study duration: The research was conducted over a comprehensive period spanning one calendar year, commencing in January 2022 and concluding in December 2022. This extended duration allowed for the collection of valuable longitudinal data, capturing potential variations and trends in patient responses over time.

Participants: The study population consisted of patients seeking medical care in both the outpatient and inpatient departments of Government Medical College, who presented with complaints of musculoskeletal pain. This real-world patient pool reflected the diverse demographics and clinical characteristics of individuals grappling with musculoskeletal discomfort.

Inclusion criteria: To ensure the relevance and safety of the study, specific inclusion criteria were applied to potential participants. Patients between the ages of 18 and 65 years were eligible for enrollment, as this age range typically encompasses a broad spectrum of musculoskeletal pain cases. Moreover, patients diagnosed with musculoskeletal pain, whether acute or chronic, were included, acknowledging the

importance of both forms of pain in clinical practice. All participants were required to provide informed consent, demonstrating their willingness to engage in the study procedures.

Exclusion criteria: Patients with known allergies or contraindications to Metaxalone or Chlorzoxazone were excluded to safeguard their well-being. Additionally, pregnant or lactating women were excluded from the study, as the safety of these medications during pregnancy and lactation is a paramount concern. Patients with severe hepatic or renal impairment, which could potentially impact drug metabolism and safety, were also excluded. Those already receiving muscle relaxants or contraindicated medications were not included to maintain consistency in treatment approaches.

Sample size: A meticulously determined sample size of 100 patients was enrolled in the study. This cohort was evenly divided, with 50 patients receiving Metaxalone and the remaining 50 prescribed Chlorzoxazone. The allocation of participants to each group was achieved through a scientifically robust simple random sampling method, minimizing bias and enhancing the study's internal validity.

Intervention: Once enrolled, patients in the Metaxalone group were administered the standard recommended dosage of Metaxalone, while those in the Chlorzoxazone group received the standard dosage of Chlorzoxazone. This standardized dosing regimen ensured consistency and comparability between the two treatment groups. Participants were carefully instructed to adhere to the prescribed medication regimen and encouraged to promptly report any side effects or deviations from the treatment plan.

Data collection: Baseline data, including pain intensity, was systematically collected using a standardized pain assessment scale. The evaluation of functional impairment was conducted through a structured questionnaire designed to capture the impact of musculoskeletal pain on patients' daily activities and their ability to perform these activities without discomfort.

Regular follow-up assessments, scheduled on a monthly basis, facilitated the tracking of patient progress. During these follow-up visits, pain intensity was re-evaluated to assess changes over time and any improvements in functional impairment were carefully documented. Furthermore, any side effects experienced by the patients were diligently recorded, contributing crucial insights into the safety profiles of Metaxalone and Chlorzoxazone.

Statistical analysis: The collected data was subjected to rigorous statistical analysis to derive meaningful conclusions. Descriptive statistics, including measures such as mean, median and standard deviation, were computed for continuous variables. Categorical data were analyzed using the chi-square test, whereas continuous data underwent t-tests to facilitate a comprehensive comparison between the two treatment groups. The threshold for statistical significance was set at a p-value of less than 0.05, ensuring robust and reliable findings.

Ethical considerations: The study was approved by the Institutional Ethics Committee of Government Medical College, Suryapet. Informed consent was obtained from all participants, ensuring they understood the purpose of the study, its procedures, potential risks and benefits. Confidentiality of the patients' data was maintained throughout the study.

RESULTS

Pain intensity: The core of our evaluation focused on pain intensity levels, measured before and after the treatment period.

Metaxalone group: At the beginning of the treatment, patients in this group had an average pain score of 8.5. By the end of the treatment, this score dramatically decreased to an average of 1.7, translating to an impressive mean reduction of 6.8 points (Table 1).

This suggests that Metaxalone had a profound effect on pain relief in the majority of the participants in this group.

Chlorzoxazone group: Similarly, patients began with an average pain score of 8.4. However, by the end of the treatment period, the post-treatment average pain score was slightly higher than that of the Metaxalone group, at 2.5. This gives us a mean pain score reduction of 5.9 points for Chlorzoxazone.

This indicates that while Chlorzoxazone is effective in treating musculoskeletal pain, it might be marginally less effective than Metaxalone.

It is worth noting that the 0.9 point greater reduction in the Metaxalone group compared to the Chlorzoxazone group was statistically significant, with a p-value of 0.043.

Table 1: Comparison of pain intensity reduction between metaxalone and chlorzoxazone in patients with musculoskeletal pain

	Groups	
Measure	Metaxalone	Chlorzoxazone
Initial pain score (mean)	8.5	8.4
Post-treatment pain score (mean)	1.7	2.5
Mean pain score reduction	6.8	5.9

Difference in mean pain score reductions was statistically significant with a p = 0.043

Table 2: Evaluation of functional impairment in patients with musculoskeletal pain treated with metaxalone and chlorzoxazone

	Groups	
Measure	Metaxalone	Chlorzoxazone
No. of patients reporting improvement	46	39
Percentage improvement	92%	78%

Table 3: Side effects profile in patients with musculoskeletal pain treated with metaxalone and chlorzoxazone

	Groups	
Measure	Metaxalone	Chlorzoxazone
No. of patients with mild side effects	5	9
Percentage of patients with side effects	10%	18%

Functional impairment: Next, we evaluated how the medications impacted daily functional activities of the participants.

Metaxalone group: Remarkably, 46 out of the 50 patients (which equates to 92%) reported noticeable improvements in their daily activities after the treatment period (Table 2).

This high percentage underscores Metaxalone's potential not just in pain relief but also in enhancing patients' quality of life by allowing them to perform their daily tasks with lesser discomfort.

Chlorzoxazone group: In this group, 39 out of 50 patients, or 78%, experienced improvements in daily functions after being treated with Chlorzoxazone.

While this is a significant majority, it is still notably lower than the Metaxalone group, suggesting a potential edge for Metaxalone in overall patient experience.

Side effects: A critical component of any medication's evaluation is its side effect profile.

Metaxalone group: 5 out of the 50 patients treated with Metaxalone (10%) reported experiencing mild side effects (Table 3).

This relatively low incidence indicates that Metaxalone is generally well-tolerated among the majority of the study participants.

Chlorzoxazone group: On the other hand, 9 out of the 50 patients (18%) treated with Chlorzoxazone reported mild side effects.

This slightly higher incidence of side effects suggests that while Chlorzoxazone is effective, patients might have a slightly higher chance of experiencing adverse effects compared to Metaxalone.

DISCUSSIONS

The comparative study conducted at Government Medical College, Suryapet, comparing the efficacy and safety of Metaxalone and Chlorzoxazone in managing musculoskeletal pain provides valuable insights that can inform clinical decision-making. This discussion will analyze our findings in the context of existing research, emphasizing both congruences and disparities with previous studies.

Efficacy in pain management: Our study demonstrated that Metaxalone was more effective in reducing pain intensity scores than Chlorzoxazone, with a mean reduction of 6.8 points compared to 5.9 points in the Chlorzoxazone group. These findings align with a study by Chou *et al*.[1]. which reported superior pain relief with Metaxalone when compared to other muscle relaxants. However, it is worth noting that our results differ from a multi-center trial conducted by Cashin *et al*.[7]. which showed marginal differences in pain relief between the two drugs, slightly favoring Chlorzoxazone. These disparities may be attributed to variations in sample sizes, demographic factors, or differences in pain evaluation methods across studies.

Functional impairment: Functional improvement is a critical aspect of pain management, as it directly impacts a patient's quality of life. In our study, 92% of patients in the Metaxalone group reported improvements in daily activities, compared to 78% in the Chlorzoxazone group. These findings are in line with a study by Togiti *et al*.[11], which suggested that Metaxalone not only provides pain relief but also significantly improves daily functionality. However, another study by Skrejborg *et al*.[12] argued that functional improvement is nearly equivalent between these two drugs, indicating that while pain relief might be better with one, day-to-day activities are equally facilitated by both.

Safety profile: Safety considerations are paramount when evaluating medications for pain management. Our study revealed that Metaxalone had a more favorable side effect profile, with only 10% of patients reporting mild side effects, compared to 18% in the Chlorzoxazone group. These findings are consistent with a meta-analysis conducted by van Tulder *et al*.[13], which favored Metaxalone regarding side effects. However, it's essential to consider a study by Ketenci *et al*.[14], which emphasized that while side effects were less frequent with Metaxalone, they were also less predictable, highlighting the importance of individual patient monitoring.

In the broader context, individual patient responses to medications can vary significantly. Factors such as genetics, metabolism rate, concomitant medications and lifestyle habits can influence drug efficacy and safety. Therefore, while our study and others provide valuable general guidance, clinical decisions should always consider individual patient profiles.

LIMITATIONS OF STUDY

Like all studies, ours had limitations. The one-year duration of the study did not allow us to assess potential long-term effects or the development of tolerance to either drug. Additionally, being a single-center study, it may not capture the broader demographic variability seen in multi-center trials.

CONCLUSION

Our study supports the notion that while both Metaxalone and Chlorzoxazone are effective muscle relaxants for managing musculoskeletal pain, Metaxalone might have a slight edge in terms of pain relief, functional improvement and safety. However, with contrasting findings in the literature, further multicentric, long-term studies are warranted to provide more definitive answers.

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