ISSN: 2149-2018

Applied Medical Research, 2025
VOL 12, NO. 1, PAGE 1 – 9
DOI: doi.org/10.47363/AMR/2025(12)257

RESEARCH ARTICLE

Open Access

Comparison of Efficacy of Metoclopramide, Promethazine and Prochlorperazine in the Treatment of Peripheral Vertigo in the Emergency Department a Triple-Blind, Randomized Controlled Trial, Multi-Centers

Asma Salim Abdallah Al Buraiki[1]*, Suad Said Khamis Albulushi[2], Ahmed Al Abri[3], AbdulAziz Al Bareiki[4], Fatema Al Rawahi[5], Khawther Al Rahbi[6] and Hana Al Ghasani[7]

[1]Emergency Medicine Residency Training Program, Oman Medical Specialty Board, Muscat, Oman

[2]Department of Emergency Medicine, Al Nahdha hospital, Muscat, Oman

[3]Department of Emergency Medicine, Sohar hospital, Sohar, Oman

[4]Department of Emergency Medicine, Army Forced hospital, Muscat, Oman

[5]Muscat, Oman Department of Emergency Medicine, Al Nahdha hospital, Muscat, Oman

[6]ENT department, Audio-vestibular medicine Al Nahdha hospital, Muscat, Oman

[7]Department of Pharmacology & Clinical Pharmacy, Muscat, Oman

ARTICLE HISTORY

Received December 20, 2024
Accepted December 26, 2024
Published January 31, 2025

ABSTRACT

Objective: Acute vertigo is a common presentation in the emergency department (ED). This study aimed to compare the therapeutic efficacy of metoclopramide, promethazine, and prochlorperazine administered via intramuscular (IM) route in patients presenting with signs and symptoms suggestive of acute peripheral vertigo to the ED. The primary outcome was to determine the most effective medication for treating vertigo in this patient population, with the secondary outcome assessing the need for rescue medication.

Methods: A triple-blind, multi-center, randomized controlled trial was conducted. Adult patients aged 18–60 years with peripheral vertigo, self-assessed with a visual analogue scale (VAS) rating of ≥5.0, were included. Participants were randomized to receive a single dose of metoclopramide, promethazine, or prochlorperazine via IM route. The primary endpoint was a reduction in VAS score at 60 minutes. Efficacy was defined as a VAS score ≤3 at 60 minutes with the least side effects and reduced need for rescue medication or maneuver. Data were analyzed using SPSS.

Results: A total of 90 patients were allocated to receive metoclopramide, prochlorperazine, or promethazine via IM route, with 30 participants in each group showing similar characteristics. The mean VAS scores deference between 0- and 60-minutes post-treatment were 4.23 (95% CI: 2.882, 5.583) for metoclopramide, 4.766 (95% CI: 3.758, 5.774) for prochlorperazine, and 4.033 (95% CI: 2.775, 5.290) for promethazine in the supine position.

The mean VAS scores deference between 0- and 60-minutes post-treatment were 4.8 (95% CI: 3.617, 5.982) for metoclopramide, 5.1 (95% CI: 4.042, 6.157) for prochlorperazine, and 4.733 (95% CI: 3.686, 5.700) for promethazine in the sitting position. The mean VAS scores difference between 0- and 60-minutes post-treatment were 5.5 (95% CI: 4.214, 6.785) for metoclopramide, 5.9 (95% CI: 4.767, 7.165) for prochlorperazine, and 5.0 (95% CI: 3.740, 6.259) for promethazine in the standing position. Based on these ANOVA results, there is no significant evidence to reject the null hypothesis that there are no differences between groups for each of the variables tested. The factors (between groups) do not significantly explain the difference in the scores for VAS score difference in three positions of assessment.

Conclusions: The results suggest that there are no significant differences in VAS scores at 60 minutes post-medication between three medication groups in supine (P= 0.705), sitting positions (p:0.839) and standing position (P= 0.494). Clinically, Difference in VAS score in standing position were higher in prochlorperazine group compare to metoclopramide and promethazine group. Metoclopramide group required more rescue medication, while the prochlorperazine group required the least. No adverse effects were noted in any group. Additionally, there was no statistically significant difference in the use of rescue medication among the three groups managed with simple manoeuvres. All patients were discharged from the ED, except one who was admitted for a posterior circulation stroke with no side effect observed from the use of medication in the study.

Contact Asma Salim Abdallah Al Buraiki, Emergency Medicine Residency Training Program, Oman Medical Specialty Board, Muscat, Oman.

Introduction

Vertigo is a common symptom that frequently prompts visits to the emergency department (ED) accompanied by nausea, vomiting, and a spinning sensation that causes a loss of balance. Headaches may also occur in conjunction with these symptoms. Vertigo may result from a central lesion but more commonly by a peripheral dysfunction of the vestibular system (eg: peripheral vestibulopathy, Meniere's disease, and benign paroxysmal positional vertigo BPPV). Prompt and accurate timely diagnosis between peripheral and central causes of vertigo, such as stroke, is crucial. Vertigo is widely regarded as distressing. The selection of an initial antivertigo medication in the emergency department (ED) depends on various factors, including drug availability, safety, efficacy, cost, and the preferences of both the doctor and the patient.

The Dix-Hallpike test is typically used at the ED as a bedside diagnostic tool to identify BPPV [1]. Epley's maneuver, which can be performed at the bedside, is a treatment option for patients with BPPV [2]. Some BPPV patients may also require medication before or after the Epley maneuver to alleviate symptoms that are provoked by applying the maneuver like nausea, vomiting, and vertigo. Medications such as metoclopramide, prochlorperazine, promethazine and dimenhydrinate have been used for this purpose [3]. Studies have explored the effectiveness of different medications in treating acute peripheral vertigo suggesting that a comprehensive approach of diagnostic tests, performing relieving maneuvers, and delivering appropriate medications can provide rapid relief of vertigo at the ED [4].

In a 2017 study conducted by Hassan Motamed et al. The effects of oral betahistine and injectable promethazine were compared in the treatment of acute peripheral vertigo in the emergency department. The study concluded that betahistine is a safe and effective drug for Managing acute vertigo, showing better outcomes compared to promethazine [5]. Another randomized controlled trial (RCT) study by Dogan Ercin et al. compared the efficacy of dimenhydrinate (DMT) and metoclopramide (MTP) in reducing nausea and vertigo symptoms in the emergency department. The results showed that both medications had similar efficacy in relieving symptoms [6]. A separate RCT study evaluated the efficacy of metoclopramide (MTCP) and diphenhydramine (DPH) in managing symptoms of motion sickness in patients transported by ambulance in the Sierra Nevada mountains of Fresno County. The study concluded that MTCP was more effective than both DPH and placebo, while DPH did not show superiority over placebo [7].

In a double-blinded, randomized clinical trial conducted by Afshin Amini et al. in 2014, intravenous promethazine was compared with lorazepam for the treatment of peripheral vertigo and vertigo-related nausea in the emergency department. The study demonstrated the superiority of promethazine in managing these symptoms in adults [8]. On the other hand, study conducted in India in 1998 by A K Singh et al. investigated the long-term effects of prochlorperazine and cinnarizine in cases of vertigo. After a 5-week treatment period, subjective improvement was observed in 100% of the prochlorperazine group and 97.14% of the cinnarizine group. The study noted a significant response to treatment in cases of peripheral vertigo compared to central causes [9].

Additionally, metoclopramide and promethazine have been extensively studied for the treatment of nausea and vomiting in conditions such as hyperemesis gravidarum, post- laparoscopic symptoms, and cannabinoid hyperemesis syndrome [10-12].

In a randomized, double-blind clinical trial conducted by Amy A. Ernst et al. in 2000, the efficacy of prochlorperazine versus promethazine was compared for treating uncomplicated nausea and vomiting in the emergency department. The study found that prochlorperazine significantly outperformed promethazine in relieving symptoms of nausea and vomiting more quickly and completely in ED patients [13].

Importance

Evidence supports the effective use of Epley manoeuvre to relieve symptoms of acute peripheral vertigo [11]. In contrast, while medications like metoclopramide, promethazine, and prochlorperazine are commonly used, there is a lack of sufficient evidence regarding their effectiveness and safety in the emergency department (ED), especially when compared to one another in treatment of peripheral vertigo [12]. This knowledge gap prompted the conduction of this study. In comparison to intravenous medications, intramuscular administration offers advantages such as faster administration, needle-free delivery, and ease of use. Implementing intramuscular medication for patients with typical presentations of acute peripheral vertigo may reduce waiting time, the need for intravenous cannulation, and unnecessary blood tests.

Goals of this Investigation

This triple-blinded, multi-center randomized controlled trial aimed to compare the efficacy of intramuscular metoclopramide, promethazine, and prochlorperazine in treating peripheral vertigo. The primary outcome is the reduction in symptom intensity, assessed using the visual analogue scale (VAS), among adults with peripheral vertigo and a VAS score of ≥5. Secondary outcomes included the need for rescue medication, the use of specific manoeuvres, treatment response (defined as a VAS score of ≤3 at 60 minutes), occurrence of any adverse events from the administered medication, and patient disposition.

Hypothesis

We hypothesize that the medication exhibiting the best safety profile will demonstrate the most effective treatment for peripheral vertigo in the emergency department, while minimizing adverse effects. Our null hypothesis states that there are no differences between the metoclopramide, promethazine, and prochlorperazine in the reduction of symptoms, side effects, need for rescue medication or admission.

Methods

Study Design and Setting

A Prospective, Triple-Blinded, Multi-Center Randomized Controlled Trial was Carried in the Emergency Departments of three Tertiary Hospitals: AL Nahdha Hospital in Muscat, Oman; AFH Hospital in Muscat, Oman; and Sohar Hospital in Sohar, Oman. Patient screening and enrolment took place from February 2021 to June 2024. To ensure allocation concealment, blocked randomization with a block size of (3,6,9) was conducted using a computer- generated sequence, and sealed envelopes were utilized for allocation.

Patients were Grouped to One of Three Groups

IM metoclopramide, IM promethazine, or IM prochlorperazine (Appendix1). The study protocol was approved by the Research and Ethics Review & Approval Committee in Muscat, Oman (MoH/CRS/21/24464) and the Armed Forces Medical Services Medical Research Ethics Committee (AFMS-MREC). Written informed consent was obtained from all participants, and the trial was registered under ClinicalTrials.gov identifier NCT05586763.

Selection of Participants

Adult patients between the ages of 18 and 60 years presenting to the emergency department with severe vertigo (VAS score ≥5), accompanied by nausea or vomiting and a clinical diagnosis of peripheral vertigo, were enrolled in the study. Diagnoses were made based on the assessment of the treating emergency physician, considering the patient's medical history, physical examination, the HINTS exam and Dix-Hallpike manoeuvre assessment. Exclusion criteria included age >60, any organic brain disease indicating a central cause of vertigo (e.g., brain metastasis), a history of epilepsy, pregnancy, dementia, Parkinson's disease, abnormal vital signs, known drug allergy to the study medications, undergoing chemotherapy or radiotherapy, mechanical bowel obstruction or perforation, gastrointestinal bleeding, inability to understand the study explanation or outcome measures, patient refusal to participate, and prior receipt of one of the study medications within the previous 24 hours. Written informed consent was obtained from all participants.

Interventions

The Randomization process utilized blocked randomization with a block size of (3,6,9). Unique codes consisting of a letter and a number were assigned to each participant to minimize recognition of the sequence. The interventions were sealed in non-transparent envelopes with the corresponding codes. Each medication group was placed in a separate box, and patients were randomly assigned to receive IM metoclopramide (10mg), IM promethazine (25mg), or IM prochlorperazine (12.5mg). Upon enrolment, the attending physician gathered a comprehensive medical history and recorded vital signs. Patients self- reported their baseline vertigo intensity using the VAS score in three different position (supine, sitting, standing). A nurse, who was unaware of the assigned intervention, opened the envelope and administered the medication according to the instructions without removing the cover. VAS scores were recorded at baseline 0 minute, and at 60 minutes after medication administration. Adverse effects, the need for rescue treatment or manoeuvres, and patient disposition were documented.

Measurements and Outcomes

The primary outcome focused on the reduction in symptom intensity, evaluated through the VAS scale, among adults with peripheral vertigo and a VAS score ≥5. Secondary outcomes included the requirement for rescue medication or manoeuvres, treatment response (VAS score ≤3 at 60 minutes), occurrence of adverse events, and patient disposition.

Statistical Analysis

Continuous variables were presented as mean, median, and standard deviation, whereas categorical variables were presented as frequency and percentage. Comparison of means between the three groups were tested using the One-way ANOVA method. Kruskal-Wallis test was performed following the One-way ANOVA for the three comparisons in finding the difference among three groups. The Association between two categorical variables were tested using a Chi-square test. A P-value less than 0.05 was considered statistically significant. All the analysis using the Statistical Package for the Social Sciences (SPSS) for Windows program, Version 29.0.

Results

Characteristics of Study Subjects

Out of 99 Initial Patients, nine were Excluded for Various Reasons

Incomplete records (2), refusal to take consented medication (n=1), allergic reaction to metoclopramide with resulting blood pressure drop (n=1), central vertigo (pons infarction) (n=1) and received one of the study medications within the previous 24 hours (n=2). Figure 1 shows the flow of participants through the study. This result in 30 patients in each group for the final analysis. Baseline characteristics were similar across groups with no significant differences in age, gender, examination, and initial VAS score (Table 1).

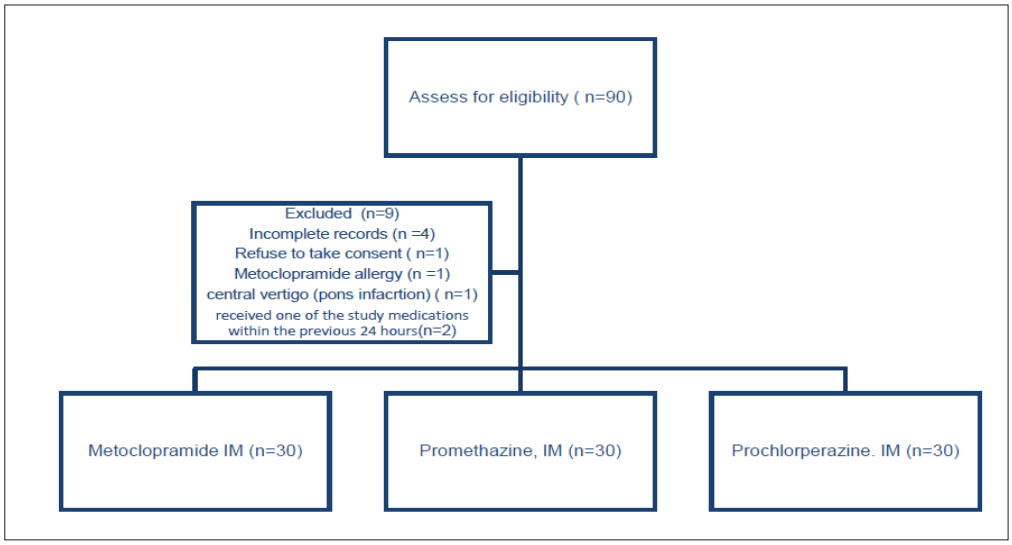


Figure 1: Enrolment Flow Diagram Showing the Allocation of Adult Patients Presenting with Severe Vertigo to the Emergency Department of the Al Nahda Hospital, Muscat, Oman, Armed Forced Hospital, Muscat, Oman and Sohar Hospital, Sohar, Oman (N = 90).

Table 1: Baseline Characteristics According to Group Allocation of adult Patients Presenting with Peripheral Vertigo to the Emergency Department of the Al Nahda Hospital, Muscat, Oman, Armed Forced Hospital, Muscat, Oman and Sohar Hospital, Sohar, Oman (N = 90).

	Metoclopramide (n=30)	Promethazine (n=30)	Prochlorperazine (n=30)
Age (years*)	39.37±10.25	45.37	±
8.704	43.87	±	
11.988			
Sex **			
Male	13 (43.3%)	10 (33.3%)	14 (46.7%)
Female	17 (56.7%)	20 (66.7%)	16 (53.3%)
Presenting symptoms**			
Vertigo	30 (100%)	30 (100%)	30 (100%)
Nausea	26 (86.7%)	28 (93.3%)	20 (66.7%)
vomiting	13 (43.3%)	12 (40.0%)	15 (50.0%)
Headache	13 (43.3%)	10 (33.3%)	16 (53.3%)
Neck- stiffness	0 (0%)	1 (50%)	1 (50%)
Positive Dix- Hallpike test**	17 (65.7%)	20 (66.7%)	15 (50.0%)
Normal HINTS exam**	29 (96.7%)	28 (93.3%)	27 (90.0%)
VAS At 0 min supine position *	6.63 ± 3.01	6.70 ± 2.68	5.87 ±2.801
VAS At 0 min sitting	7.10 ± 2.631	7.33 ± 2.279	6.57 ± 2.661
VAS At 0 min standing position*	8.00 ± 3.085	7.70 ±2. 891	8.13 ± 2.2401

Prior to enrolment, patients underwent Dix-Hallpike maneuver and HINT examination to help in differentiating peripheral and central vertigo. Online workshops by an ENT consultant Dr Kawther.R were conducted at all study centers.

Assessments Revealed the following Results

The metoclopramide group had a positive Dix- Hallpike assessment in 30.8% of cases, the prochlorperazine group showed 28.8%, and the promethazine group demonstrated 40.4%. Dix-Hallpike assessments were not conducted for a total of 29 patients out of the 90 enrolled due to severe symptoms that prevented the examination. Regarding the HINTS exam conducted to rule out central causes, the metoclopramide group had 96.7% normal results, the prochlorperazine group had 89.7% normal results, and the promethazine group showed 93.3% normal results. The assessments not performed were attributed to severe symptoms that hindered test tolerance (see Table 1).

Main Result

The VAS scores at 0 minutes in the supine position were as follows: the metoclopramide group had a mean score of 6.63 (95% CI: 6.51–7.76), the promethazine group had a mean of 6.70 (95% CI: 5.70–7.70), and the prochlorperazine group reported a mean of 5.87 (95% CI: 4.82–6.91), with a p-value of 0.389. In the sitting position, the VAS scores at 0 minutes were: metoclopramide 7.10 (95% CI: 6.12–8.08), promethazine 7.33 (95% CI: 6.48–8.18), and prochlorperazine 6.57 (95% CI: 5.86–7.57), resulting in a p-value of 0.490. For the standing position, the scores at 0 minutes showed no statistically significant differences: metoclopramide had a mean of 8.00 (95% CI: 6.85–9.15), promethazine 7.70 (95% CI: 6.62–8.78), and prochlorperazine 8.13 (95% CI: 7.30–8.97), with a p-value of 0.837 (see Table 1 and Figure 2).

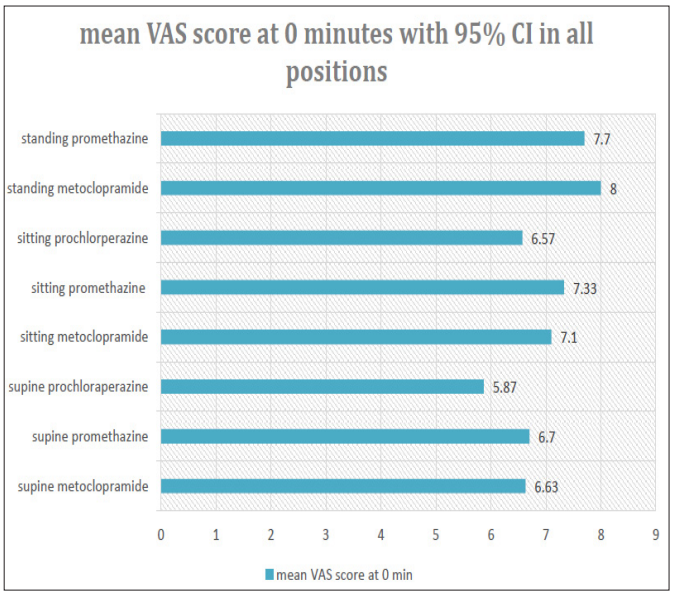


Figure 2: Mean VAS Score at 0 Minutes with 95% CI in all Positions (N=90)

At the 60-minute assessment post-medication, significant differences in VAS scores were observed in the supine and sitting positions, indicating that one or more drugs were more effective than others in these positions. Specifically, the p-values were 0.006 in the supine position and 0.027 in the sitting position. However, no statistically significant differences in effectiveness were found among the drugs in the standing position (see Table 2 and Figure 3).

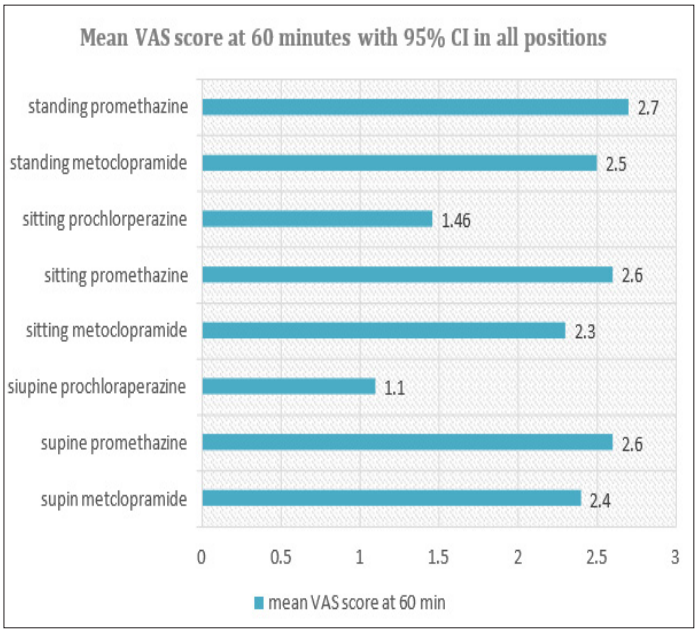


Figure 3: This Plot Visualizes the mean Visual Analog Scale (VAS) Scores at 60 Minutes, for Patients in three Different Positions and Across three Medication Groups. Each Line Connects the mean Scores at the two time Points for a Specific Group and Position.

Table 2: Outcome measures according to Group Allocation of Adult Patients Presenting with Peripheral Vertigo to the Emergency Department of the Al Nahda Hospital, Muscat, Oman, Armed Forced Hospital, Muscat, Oman and Sohar Hospital, Sohar, Oman (N = 90).

* Mean ± standard deviation

Outcome Metoclopramide (N=30) Promethazine (N=30) Prochlorperazine (N=30) P Value

VAS score*				
VAS at 60 min supine position	2.4 ± 2.633	2.666 ± 3.032	1.1 ± 1.90	0. 006
VAS at 60 min sitting position	2.3 ± 2.019	2.6 0± 2.68	1.46 ± 2.374	0.027
VAS at 60 min standing position	2.5 ± 2.315	2.7 ± 2.984	2.780 ± 0.507	0.470

When comparing the VAS score differences between 0- and 60-minutes post-medication, no significant differences were noted. In the supine position, the mean VAS score difference was 4.233 for metoclopramide (95% CI: 2.88-5.58), 4.77 for prochlorperazine (95% CI: 3.76¬-5.77), and 4.03 for promethazine (95% CI: 2.78-5.29). Clinically, this suggests that the prochlorperazine group exhibited a lower reduction in mean VAS compared to the other groups, but no statistically significant differences were found (p-value 0.705).

In the sitting position, the mean VAS score differences were 4.80 for metoclopramide (95% CI: 3.62–5.98), 5.10 for prochlorperazine (95% CI: 4.04-6.16), and 4.73 for promethazine (95% CI: 3.69–5.78). Again, there were no statistically significant differences between the groups (p-value 0.839). In the standing position, the mean VAS score differences were 5.50 for metoclopramide (95% CI: 4.21–6.78), 5.97 for prochlorperazine (95% CI: 4.77–7.17), and 5.00 for promethazine (95% CI: 3.74–6.26). Similar to the other positions, no significant differences were observed (p-value 0.494) (see Table 3 and Figure 4).

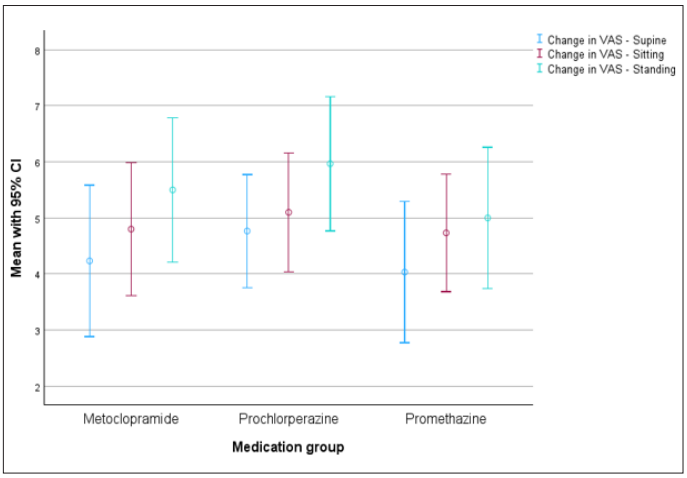


Figure 4: Error Bar Depicting the mean Changes in the VAS Score with 95% CI at 0 and 60 Minutes, for Patients in three Different Positions and Across three Medication Groups. Each Line Connects the mean Scores at the two time Points for a Specific Group and Position. Shaded Boxes Represent the 95% Confidence Intervals Around these means.

Table 3: Outcome Measures According to Group Allocation of Adult Patients Presenting with Peripheral Vertigo to the Emergency Department of the Al Nahda Hospital, Muscat, Oman, Armed Forced Hospital, Muscat, Oman and Sohar Hospital, Sohar, Oman (N = 90).

* Mean ± standard deviation

Outcome Metoclopramide (N=30) Promethazine (N=30) Prochlorperazine (N=30) P Value

VAS score*				
VAS difference supine position	4.233 ± 3.6168	4.033 ± 3.368	4.766 ± 2.699	0.705
VAS difference sitting position	4.800 ± 3.166	4.733 ± 2.803	5.100 ± 2.832	0.839
VAS difference standing position	5.500 ± 3.441	5.00 ± 3.733	5.966 ± 3.210	0.494

Regarding the need for rescue medication, the metoclopramide group required rescue treatment in 42.3% of cases, compared to 30.8% in the promethazine group and 26.9% in the prochlorperazine group. However, these differences were not statistically significant (p-value: 0.496).

Betahistine as rescue medication also showed no statistically significant association among the groups, with usage rates of 13.3% (n=4) in metoclopramide, 14.3% (n=4) in prochlorperazine, and 3.3% (n=1) in promethazine (p-value = 0.269). Similarly, ondansetron use exhibited no significant differences: 44.4% (n=8) in metoclopramide, 16.7% (n=3) in prochlorperazine, and 38.9% (n=7) in promethazine (p-value = 0.233).

In terms of performing the Epley maneuver as rescue maneuver, no statistically significant associations were found among the groups, with rates of 50% (n=3) in metoclopramide, 16.7% (n=1) in prochlorperazine, and 33.3% (n=2) in promethazine (p-value = 0.572) (see Table 4 and Figure 5).

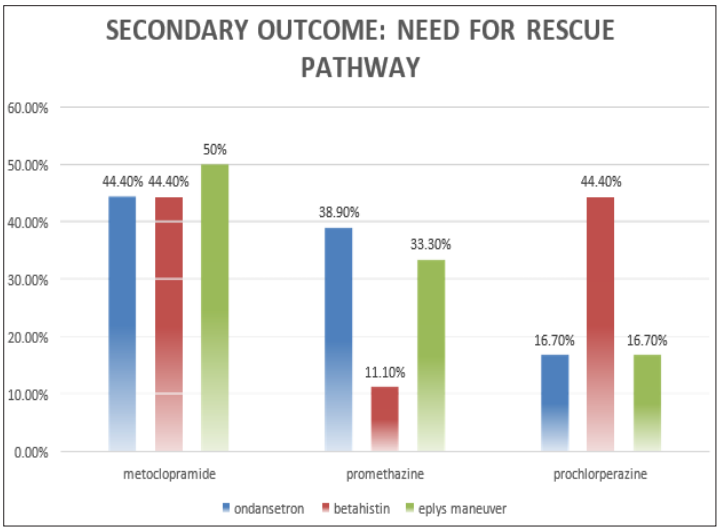


Figure 5: Outcome Measures in Term of Rescue Medication and Maneuver Needed According to Group Allocation of Adult Patients Presenting with Peripheral Vertigo to the Emergency Department of the Al Nahda Hospital, Muscat, Oman, Armed Forced Hospital, Muscat, Oman and Sohar Hospital, Sohar, Oman (N = 90).

- ** Percentages for this variable were calculated out of the total number of patients for whom this information was available

Table 4: Outcome Measures in Term of Rescue Needed According to Group Allocation of Adult Patients Presenting with Peripheral Vertigo to the Emergency Department of the Al Nahda Hospital, Muscat, Oman, Armed Forced Hospital, Muscat, Oman and Sohar Hospital, Sohar, Oman (N = 90).

- ** Percentages for this variable were calculated out of the total number of patients for whom this information was available

Rescue Medication S Required **	Metocloprami (N=90)	Promethazin E (N=90)	E prochlorperazi (N=90)	NEP value
Betahistin	4 (44.4%)	1 (11.1%)	4 (44.4%)	0.269
Ondansetron	8 (44.4%)	7 (38.9%)	3 (16.8%)	0.233
Epley maneuver	3 (50.0%)	2 (33.3%)	1 (16.7%)	0.572

Limitations

This study faced challenges due to the context of the COVID-19 pandemic, resulting in a reduced number of vertigo patients seeking emergency care. Efforts were made to standardize assessments through online workshops, but the impact of the pandemic on healthcare seeking behaviours was inevitable. Additionally, the study encountered limitations originating from a relatively small sample size, determined based on lack of prior similar studies and calculated as a rule of thumb.

Despite rigorous training and ongoing communication with sites, the study experienced challenges related to physician engagement. Physicians cited the perceived length of the data collection process as a hindrance, leading to modifications such as reducing patient reassessment frequency without compromising outcomes. The shortened reassessment intervals from 0, 30, and 60 minutes to 0 and 60 minutes aimed to streamline data collection, yet enrolment issues persisted due to the busy nature of emergency department shifts and time

constraints. These circumstances further underscored the need for pragmatic adjustments in study protocols to suit real-world clinical settings.

Discussion

Findings and Interpretation

In this randomized clinical trial, we aimed to compare the effectiveness of intramuscular (IM) metoclopramide, promethazine, and prochlorperazine in treating acute peripheral vertigo. Our findings demonstrate that these medications showed comparable efficacy in achieving treatment goals and reducing the need for rescue medications within 60 minutes post-administration. The study's primary goal was to assess the efficacy of metoclopramide, prochlorperazine, and promethazine in reducing symptom intensity among adults with peripheral vertigo. We evaluated their effectiveness using the Visual Analog Scale (VAS) to measure reductions in VAS scores across different body positions (supine, sitting, and standing). Overall, while all three medications demonstrated comparable efficacy, Prochlorperazine showed a consistent trend toward greater effectiveness in reducing symptom intensity in the standing position over 60 minutes compared to other medication and position combinations studied (Figure 6). These findings underscore the need for further research to explore these trends in larger, more diverse population.

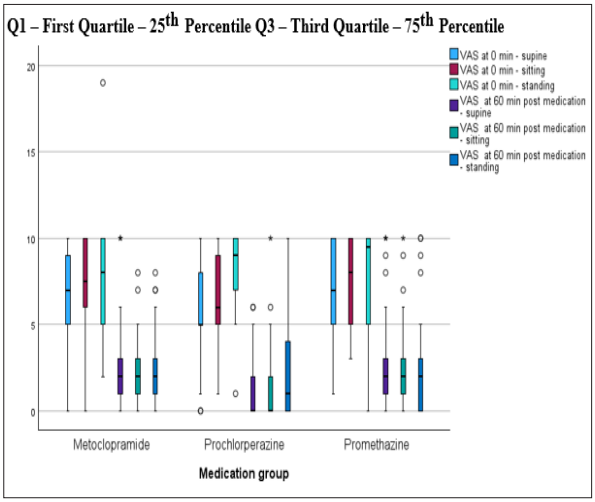


Figure 6: Box Plot Depicting the Five-Point Summary Statistics (Median, Q1, Q3, Minimum and Maximum) of the VAS Score for three Group of Medication in all three Positions of Assessment.

Patient Exclusions and Baseline Characteristics

Nine patients were excluded from the study for various reasons, including incomplete records, refusal of consent, and medical reasons such as allergic reactions and recent medication intake. This resulted in a final analysis of 30 patients per group, ensuring comparability in baseline characteristics such as age, gender, examination findings, and initial VAS scores. This robust selection process helps in minimizing confounding factors and strengthens the validity of subsequent findings.

Diagnostic Assessments

Prior to enrolment, patients underwent diagnostic assessments (Dix-Hallpike maneuver and HINTS examination) to differentiate between peripheral and central vertigo. These assessments were standardized across all hospital sites through online workshops conducted by an audio-vestibular consultant. The results indicated varying percentages of positive Dix- Hallpike maneuver assessments across the groups, suggesting potential differences in vertigo e etiology. Additionally, the majority of patients across all groups showed normal HINTS exam results, confirming predominantly peripheral vertigo cases in the study population.

Primary Outcome - VAS Scores at 60 Minutes

The study's primary outcome focused on VAS scores at 60 minutes post-medication administration. Significant differences were observed in the supine and sitting positions among the drugs (Metoclopramide, Promethazine, and Prochlorperazine), indicating varying effectiveness in reducing vertigo symptoms. However, no significant differences were found in the standing position. This highlights the importance of positional considerations when evaluating drug efficacy in vertigo management.

VAS Score Differences (0-60 Minutes)

Analysis of VAS score differences between 0- and 60-minutes post-medication revealed no statistically significant differences among the groups across all three positions (supine, sitting, standing). Clinically, while Prochlorperazine administered in the standing position appears to have the most significant effect on the measured parameter over 60 minutes compared to other medication and position combinations studied, this did not reach statistical significance. This suggests that all three drugs may have comparable short-term efficacy in reducing vertigo symptoms within the studied timeframe (Figure 7).

Q1 – First Quartile – 25th Percentile Q3 – Third Quartile – 75th Percentile

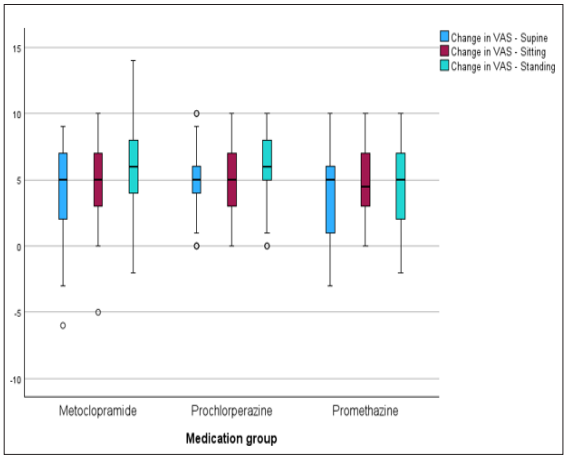


Figure 7: Comparison of VAS Score Changes by Medication and Patient Position. Box Plot Depicting the Five-Point Summary Statistics (Median, Q1, Q3, Minimum and Maximum) of the Changes in the VAS Score

Rescue Management and Additional Treatments

The need for rescue management was assessed across the groups, with a higher percentage observed in the Metoclopramide group compared to Promethazine and Prochlorperazine, although this difference was not statistically significant. In a 2021 randomized controlled trial (RCT) comparing the efficacy of dimenhydrinate and metoclopramide for treating nausea due to vertigo, it was found that both medications have similar efficacy in reducing nausea and vertigo symptoms in the emergency department (ED) [14].

Similarly, the use of Betahistine and Ondansetron did not show significant associations with the treatment groups. These findings imply that while rescue interventions were required in a subset of patients, their use did not vary significantly based on the initial medication administered.

A 2019 clinical trial conducted by Alia Saberi et al. compared ondansetron and promethazine for the treatment of acute peripheral vertigo. The results indicated that while promethazine is more effective in curing peripheral vertigo, ondansetron is more beneficial for improving nausea and vomiting [15].

Clinical Implications and Future Directions

Despite the limitations, the study provides valuable insights into the comparative effectiveness of Metoclopramide, Promethazine, and Prochlorperazine in managing vertigo symptoms. Future research could explore longer-term outcomes beyond 60 minutes post- medication and include larger, multi-center studies to enhance generalizability. Moreover, assessing patient-reported outcomes and quality of life measures could further elucidate the overall impact of these treatments on vertigo management.

In conclusion, while this study contributes valuable data on the acute management of vertigo in emergency settings, careful consideration of its limitations is essential when interpreting and applying these findings in clinical practice. While all medications demonstrated efficacy in symptom reduction across different body positions, no significant differences were observed between them. These findings underscore the need for personalized treatment approaches based on patient preferences, tolerability, and specific clinical presentations.

Recommendation

Based on the study, there's no significant difference in efficacy among intramuscular metoclopramide, promethazine, and prochlorperazine for acute peripheral vertigo. Clinicians can choose any based-on patient factors. Metoclopramide and promethazine showed similar efficacy in supine position, while prochlorperazine had slightly lower efficacy. Caution is advised with metoclopramide, as more rescue medication was needed. All three medications were safe. Choice of medication didn't impact patient disposition. Future research should explore larger samples and long-term outcomes. Updating guidelines to reflect medication equivalence and emphasize individualized choices is recommended.

Acknowledge

Ph Sheikha Almamari PDH, Dr Usama Al Khalasi, Dr Suad Al Sulimani, Dr Muzna Al Sawafi, Dr. Huda Al Shibli, Sathiya.M.

Funding Information

This study was funded by the Oman Medical speciality Board, Research Funding Program (GRG), Muscat, Oman

Conflicts of Interest

None of the authors have any conflicts of interest to disclose.

Ethics Approval

Our study protocol was approved by Research and Ethics review & approval committee, Muscat, Oman (MoH/CRS/21/24464) and Armed forces medical services medical research ethics committee (AFMS-MREC). All patients supplied written informed consent prior to their participation in the trial.

Trial Registration

Our trial was registered under ClinicalTrials.gov identifier NCT05586763

Author Contributions

Asma B was the primary investigator of the research.

Asma B and Suad B conceived of the study, study idea; Dr. Suad.B. Asma.B designed the trial. Asma.B obtained research funding from OMSB.

Dr Khawther R: workshop, training in vertigo assessment.

Hana G and Sheikha Almamari: help in providing medication and follow up the medication randomization in study centers.

Asma B, Suad B, Ahmed A, Abdualaziz B supervised the conduct of the trial and performed data collection. Suad B, Ahmed A, Abdualaziz B , Fatema R undertook follow-up of participating patients and manuscript review.

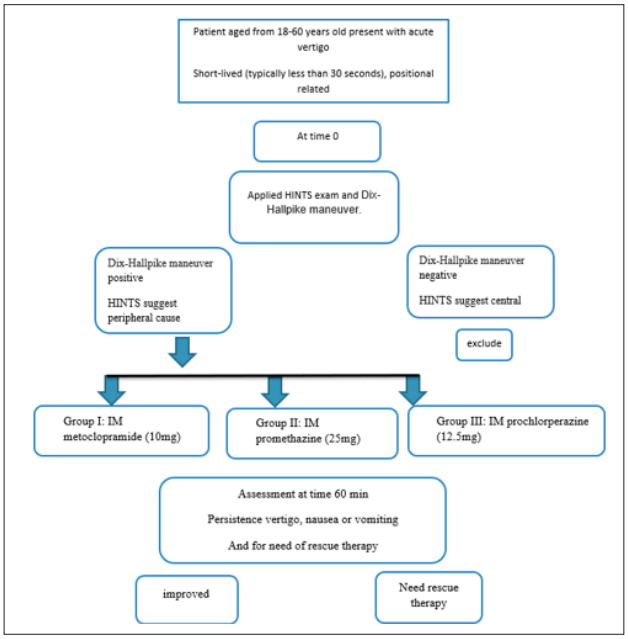
Huda S, Muzna S and Suad S help in follow up data collection

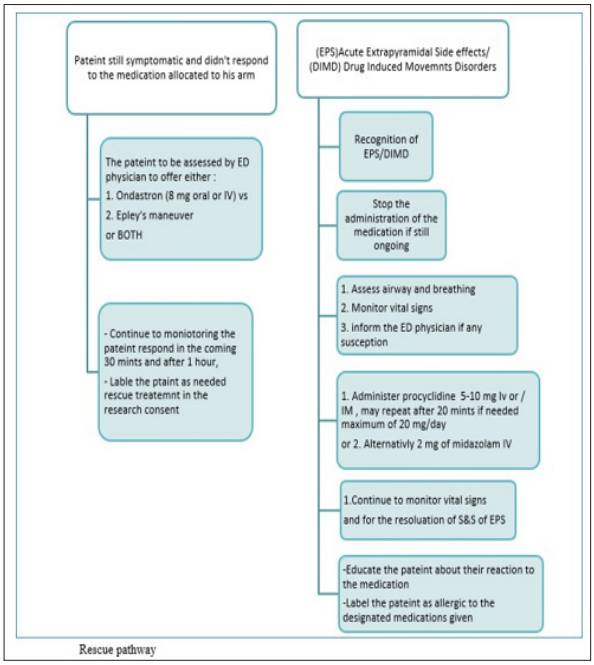
Sathiya M provided statistical advice on the study design and result analysis.

Asma B conducted the statistical analyses for the study. Asma B drafted the manuscript and all authors contributed substantially to its revision.

Suad B takes responsibility for the paper as a whole as the corresponding author and review

Appendix 1:





References

[1] Xiaokai Yang, Lidan Gao. Simulation Study of BPPV Fatigability, PMC. 2022; 13: 874699.

[2] Amr Nabil Rabie. Canalith-Repositioning Maneuvers: Overview, Indications, Contraindications, Medscape. 2021.

[3] Chi Tam Nguyen, Mark Basso. Epley Maneuver, StatPearls NCBI Bookshelf. 2022; https://www.ncbi.nlm.nih.gov/sites/books/NBK563287/.

[4] Michael Strupp, Thomas Brandt. Diagnosis and Treatment of Vertigo and Dizziness, PMC. 2008; 105: 173-180.

[5] Hassan Motamed, Meisam Moezzi, Ali Dalir Rooyfard, Kambiz Ahmadi Angali, Zahra Izadi. A Comparison of the Effects and Side Effects of Oral Betahistine with Injectable Promethazine in the Treatment of Acute Peripheral Vertigo in Emergency, J Clin Med Res. 2017; 9: 994-997.

[6] Dogan Ercin, Bulent Erdur, Ibrahim Turkcuer, Murat Seyit, Mert Ozen, et al. Comparison of efficacy dimenhydrinate and metoclopramide in the treatment of nausea due to vertigo; a randomized study, Am J Emerg Med. 2020; 40: 77-82.

[7] Stephanie Rubio, Lori Weichenthal, Jim Andrews. Motion Sickness: Comparison of Metoclopramide and Diphenhydramine to Placebo, Randomized Controlled Trial. 2011; 26: 305-309.

[8] Amini Afshina, Heidari Kamranb, Asadollahi Shadic, Habibi Tahereha, Shahrami Ali, et al. A double blind, RCT. Intravenous promethazine versus lorazepam for the treatment of peripheral vertigo in the emergency department, randomized clinical trial of efficacy and safety, iospress. 2014; 24: 39-47.

[9] Singh AK, Chaturvedi VN. Prochlorperazine versus cinnarizine in cases of vertigo, Otolaryngol Head Neck Surg. 1998; 50: 392-397.

[10] Catherine McParlin, Amy O'Donnell, Stephen C Robson, Fiona Beyer, Eoin Moloney, et al. Treatments for Hyperemesis Gravidarum and Nausea and Vomiting in Pregnancy: A Systematic Review, JAMA. 2016; 16: 1392-1401.

[11] Mohammad Talebpour, Naser Ghiasnejad Omrani, Farsad Imani, Reza Shariat Moharari, Pejman Pourfakhr, et al. Comparison Effect of Promethazine/Dexamethasone and Metoclopramide /Dexamethasone on Postoperative Nausea and Vomiting after Laparascopic Gastric Placation: A Randomized Clinical Trial, Anesth Pain Med. 2017; 7: e57810.

[12] John R Richards, Brent K Gordon, Aaron R Danielson, Aimee K Moulin. Pharmacologic Treatment of Cannabinoid Hyperemesis Syndrome: A Systematic Review, Pharmacotherapy. 2017; 37: 715-734.

[13] Amy A Ernst, Steven J Weiss, Sun Park, Kevin M Takakuwa, Deborah B Diercks. Prochlorperazine versus promethazine for uncomplicated nausea and vomiting in the emergency department: a randomized, double-blind clinical trial, Ann Emerg Med. 2000; 36: 89-94.

[14] Dogan Ercin, Bulent Erdur, Ibrahim Turkcuer, Murat Seyit, Mert Ozen, et al. Comparison of efficacy dimenhydrinate and metoclopramide in the treatment of nausea due to vertigo; a randomized study, Science Direct. 2021; 40: 77-82.

[15] Alia Saberi, Seyed Hashem Pourshafie, Ehsan Kazemnejad-Leili, Shadman Nemati, Sara Sutohian, et al. Ondansetron or promethazine: Which one is better for the treatment of acute peripheral vertigo?, Science Direct. 2019; 40: 10-15.