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EVALUATION OF THE EFFECTIVENESS OF PHYSIOTHERAPY IN MUSCULOSKELETAL PAIN AND JOINT PAIN PATIENTS OF LEVEL 2 FIELD HOSPITAL NO. 6

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ABSTRACT

Objective: This study aimed to evaluate the effectiveness of physiotherapy in managing musculoskeletal and joint pain at Vietnam's Level 2 Field Hospital No. 6.

Subjects and Methods: A total of 109 outpatients with musculoskeletal or joint pain were enrolled and treated with physiotherapy, involving at least three of the following techniques: shortwave therapy, therapeutic ultrasound, electrical stimulation, acupuncture, and infrared light therapy. Each patient underwent a minimum of 10 treatment sessions. Pain levels were assessed using the Visual Pain Scale (VPS) at three time points: Day 0 (baseline), Day 5, and Day 10.

Results: Pain levels significantly decreased over time, with mean VPS scores reducing from 6.34 ± 1.77 (Day 0) to 4.09 ± 1.41 (Day 5), and further to 1.21 ± 1.13 (Day 10) ($p < 0.001$ for all comparisons). No adverse effects were reported.

Conclusion: Multimodal physiotherapy proved to be an effective and safe approach in alleviating musculoskeletal and joint pain in the resource-constrained setting of a field hospital.

Keywords: Physiotherapy, musculoskeletal pain, joint pain, field hospital, multimodal therapy.

1. INTRODUCTION

Musculoskeletal pain is one of the most common reasons patients seek medical care and significantly affects quality of life, especially among individuals engaged in military or high-intensity physical activities [1]. In the specific context of United Nations peacekeeping operations in South Sudan, access to non-pharmacological, safe, and effective treatment modalities is a top priority, with physiotherapy standing out.

Physiotherapy has been demonstrated to alleviate pain, restore function, and reduce long-term reliance on analgesics in musculoskeletal disorders [2],[3]. In austere environments, such as field hospitals where medical resources are limited, implementing conservative, minimally invasive, and context-appropriate therapeutic strategies becomes essential. Level 2 Field Hospital No. 6 (Level 2 FH No. 6) of Vietnam, stationed in South Sudan, was tasked with receiving, diagnosing, and managing common medical conditions among peacekeeping forces and the local population. During the first six months of operation, the proportion of patients presenting with musculoskeletal pain was relatively high, underscoring the need to evaluate the effectiveness of non-pharmacological interventions, such as physiotherapy, to optimize treatment outcomes and inform clinical practice.

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Physiotherapy utilizes physical agents, including heat, electricity, light, ultrasound, and mechanical techniques, to manage pain and improve mobility safely and effectively. It is therefore a practical treatment option in field hospital settings where medication supplies are constrained. This study aims to evaluate the effectiveness of physiotherapy in treating musculoskeletal and joint pain at Level 2 Field Hospital No. 6.

2. SUBJECTS AND METHODS

2.1. Study Subjects

The study included 109 outpatients with musculoskeletal pain treated by physiotherapy at Vietnam Level 2 Field Hospital No. 6 (October 2024 – April 2025).

- *Inclusion criteria:* Patients with muscle or joint pain due to trauma or non-traumatic causes (e.g., inflammation, joint degeneration).

- *Exclusion criteria:* Pain due to visceral causes; contraindications to physiotherapy (e.g., arrhythmia, respiratory disorders, presence of metallic implants such as pacemakers or prosthetic joints); patients undergoing other forms of pain treatment outside the physiotherapy protocol used in this study; patients noncompliant with treatment or who discontinued the therapy.

2.2. Study Design

This study employed a convenience sampling method.

2.3. Study procedure

Eligible patients with a clinical diagnosis of musculoskeletal or joint pain were prescribed physiotherapy involving at least three out of the following five modalities: shortwave diathermy, therapeutic ultrasound, transcutaneous electrical nerve stimulation (TENS), acupuncture, and infrared light therapy. The selection of modalities was based on the clinical presentation and device-specific treatment guidelines.

Each session lasted 30–45 minutes per day, for a minimum of 10 consecutive days, with 1–2 minute breaks between methods.

*** Assessment of treatment outcomes:**

Patients were guided by medical personnel to self-assess their pain using a standardized United Nations pain assessment form (Figure 1), which included the Visual Pain Scale (VPS) ranging from 0 (no pain) to 10 (worst pain). Pain intensity was recorded at three time points: Day 0 (start of treatment), Day 5, and Day 10. Patients requiring longer treatment durations were still evaluated at Day 10 to maintain data consistency.

Therapeutic equipment used:

- CURAPULS 970 shortwave diathermy unit (Enraf-Nonius, Netherlands)

- Endomed 482 therapeutic ultrasound machine (Enraf-Nonius, Netherlands)

- TENS unit (Itelect Legend XT model, Chattanooga, USA)

- Infralux 300 infrared lamp (Daekung Medical, South Korea)

-Single-use sterile acupuncture needles (Hai Nam, China)

2.4. Study variables

- Primary outcome: Pain intensity measured by VPS at Day 0, Day 5, and Day 10.

- Independent variables: Age, gender, pain location (shoulder, neck, lumbar spine, knee, foot, etc.), applied therapy type (single vs. combination), number of treatment sessions.

- Subgroup variables: Age group, pain location, type of physiotherapy intervention.

2.5. Data analysis: Data were processed using Stata 14.1. Quantitative variables were presented as means ± standard deviations; qualitative variables were summarized as frequencies and percentages. Pain intensity over time (D0–D5–D10) was compared using the Friedman test for repeated measures. Where statistical significance was found, post-hoc pairwise comparisons were conducted using Wilcoxon signed-rank tests.

2.6. Ethical Considerations: This study adhered to ethical standards in biomedical research. Data were collected retrospectively from medical records without any additional intervention or risk to patients. Patient identities were anonymized and strictly protected. The leadership approved the study protocol of Vietnam Level 2 Field Hospital Rotation 6.

3. RESULTS

Table 1. General characteristics of the study group

Characteristics		Number (n)	Percentages (%)
Age groups	< 40	62	56.88
	≥ 40	45	43.12
Average age (years)		40,62 ± 7,82	

Characteristics		Number (n)	Percentages (%)
Gender	Male	86	78.90
	Female	23	21.10
Nationality	Ghana	54	49.54
	Sudan	12	11.01
	Pakistan	9	8.26
	Mongolia	9	8.26
	India	6	5.50
	Kenya	7	6.42
	Uganda	3	2.75
	Egypt	2	1.83
	Somali	3	2.75
	Ethiopia	2	1.83
	Ukraina	1	0.92
	Yemen	1	0.92

The average age of the study subjects was 40.62 ± 7.82 years, with 56.88% of the subjects being under 40 years old. The male group accounted for a high proportion (78.90%) compared to the female group (21.10%), which is consistent with the characteristics of military personnel performing missions in the United Nations Peacekeeping Force. Patients from 13 different countries came for treatment, with the highest numbers from Ghana (49.54%), followed by Sudan (11.01%), Pakistan and Mongolia (each 8.26%), India (5.50%), Kenya (6.42%), and others.

Table 2. Pain location and characteristics

Pain characteristics		Number (n)	Percentages (%)
Pain location	Neck	6	5.50
	Shoulder	8	7.34
	Elbow	3	2.75
	Wrist	8	7.34
	Lumbar/hip	59	54.13
	Knee	19	17.43
	Ankle	6	5.50

Pain characteristics		Number (n)	Percentages (%)
Pain type	Throbbing	3	2.75
	Shooting	8	7.34
	Stabbing/ Sharp	26	23.85
	Dull/Aching	47	43.12
	Hot/Burning	9	8.26
	Cramping	11	10.09
	Heavy/ Pressure/ Crushing	5	4.59

The study results showed that the lumbar–hip region was the most common site of pain, accounting for 54.13%, which is consistent with the characteristics of physical labor and incorrect posture in military or peacekeeping environments. This was followed by the knee area (17.43%), and then the wrist and shoulder (both at 7.34%), suggesting a link to repetitive limb movement and heavy lifting. Regarding the pain characteristics, dull or aching pain predominated at 43.12%, indicating the prevalence of chronic pain among the study participants. Other types of pain, such as stabbing/sharp, accounted for 23.85%, cramping pain for 10.09%, and burning pain for 8.26%, reflecting the diversity in pathophysiology related to musculoskeletal or neuropathic conditions. Although the proportions of electric shock-like pain (7.34%) and heavy pressure pain (4.59%) were lower, they should be noted due to possible neurological associations.

Table 3. Pain levels and treatment effectiveness

Pain level (VPS)	Mean ± SD	p-value	Side effects
Day 0 (D0)1	6.34 ± 1.77	p1-2 < 0.001	None
Day 5 (D5)2	4.09 ± 1.41	p2-3 < 0.001	None
Day 10 (D10)3	1.21 ± 1.13	p1-3 < 0.001	None

The average pain score (VAS scale) before treatment was 6.34 ± 1.77, indicating a moderate to severe level of pain. After 5 days of treatment, the average pain score decreased significantly to 4.09 ± 1.41; after 10 days, it dropped sharply to 1.21 ± 1.13. The statistical analysis showed that the differences between the days were highly significant ($p < 0.001$). This result confirms that the combination of multiple physiotherapy methods used at Level 2 Field Hospital Rotation 6 has sound and clear pain-relieving effects. No side effects were recorded during the treatment process, confirming the safety of the methods applied.

4. DISCUSSION

Our study results showed that the mean age of patients was 40.62 ± 7.82 years. This result is consistent with the fact that our hospital treats only patients who are United Nations (UN) staff on mission in Bentiu, a group primarily in the working-age population. Regarding gender distribution, the results showed that the proportion of males was higher than that of females (78.90% compared to 21.10%), because most UN personnel in Bentiu are male. The predominance of males (81.7%) reflects the characteristics of the military personnel involved in peacekeeping missions—a special population engaged in high-intensity physical activities and working in harsh conditions, which contributes to a high rate of musculoskeletal injuries. According to a study by Santini et al., military personnel have a higher prevalence of musculoskeletal pain than the general population, likely due to the physical demands and repetitive tasks of their work [4]. We observed that patients came from 12 different countries, reflecting the multinational working environment at the UNMISS mission base. Among them, patients from Ghana had the highest proportion (49.54%), which aligns with the fact that the hospital's catchment area includes two Ghanaian units (a police unit and a military battalion). These are units that frequently engage in physically demanding activities and are more prone to musculoskeletal injuries and joint pain.

Regarding pain location, we recorded the highest proportions of pain in the lower back–hip area and knees, with rates of 54.13% and 17.43%, respectively. This result is consistent with the fact that these areas are commonly subjected to the most significant load of the body, combined with repetitive motion activities, leading to a higher risk of trauma, degeneration, arthritis, or inflammation than other sites.

In terms of pain characteristics, we mainly observed dull/aching pain (43.12%), stabbing/sharp pain (23.84%), and muscle spasm pain (10.09%), indicating that musculoskeletal pain is typically associated with inflammatory conditions, degenerative joint disease, or soft tissue injuries. In contrast, pain types such as rhythmic pain, burning, electric-shock-like sensations, or heavy pain are less common and may reflect nerve damage or tissue edema in the study group. According to the World Health Organization's pain classification, pain characteristics can support the selection of appropriate physical therapy methods and improve treatment outcomes. For acute pain resulting from soft tissue injuries, such as tendon strains or sprains, combining ultrasound therapy, electrotherapy, and infrared therapy is recommended to reduce inflammation, alleviate pain, and promote recovery. In cases of chronic pain caused by osteoarthritis, acupuncture combined with shortwave therapy and electrotherapy improves blood circulation, reduces pain, and enhances mobility. Pain in the neck and shoulders due to periarthritis is treated with shortwave treatment, ultrasound, and infrared therapy to relieve muscle stiffness and improve joint movement [5]. Our study also showed that the mean pain score at the beginning of treatment was 6.34 ± 1.77, and this score significantly decreased over time. To determine whether the reduction was statistically significant at different time points, we conducted a Repeated-Measures ANOVA test with pairwise comparisons using the Bonferroni adjustment. The results showed that all comparisons between time points (D5 vs. D0, D10 vs. D0, and D10 vs. D5) had statistically significant pain reductions ($p < 0.001$).

Thus, our study demonstrated that musculoskeletal pain treatment using physical therapy resulted in significant pain reduction throughout all stages of the intervention. These physical therapy methods are based on the principle of delivering deep heat into the tissue to promote circulation, relax muscles, reduce pain, and accelerate soft tissue recovery. Specifically, shortwave therapy provides deep heat to stimulate circulation, reduce spasms, and relieve pain in damaged tissue; infrared therapy provides local heat with anti-inflammatory effects, reduces pain, and promotes healing; transcutaneous electrical nerve stimulation (TENS) at low frequencies helps relieve pain through the endogenous pain control system; infrared lamps provide thermal energy to relax muscles, dilate blood vessels, promote local metabolism, and reduce pain [5]. Acupuncture balances blood circulation and harmonizes internal organs through meridians to relieve pain. Regarding modern mechanisms, acupuncture stimulates nerve and endocrine responses, increasing the release of endogenous opioids [6]. These findings align with current trends in physical therapy, favoring the combination of multiple methods to enhance efficacy rather than relying on a single modality [7], [8], [9].

During treatment, we also monitored for potential adverse events, including redness, burning, soft tissue hypersensitivity, tingling, discomfort, bruising, dizziness, infection, and arrhythmia. To minimize risks, we selected suitable techniques for each patient, followed the manufacturer's guidelines, and carefully monitored patients before and after treatment. The results showed that all patients were safe and no severe adverse events were recorded.

This study's limitation is the lack of a control group, which prevents the complete exclusion of confounding factors such as psychological influences or concurrent medication use. The convenience sample at a single clinical site also restricts the generalizability of the findings. Moreover, the study did not conduct an analysis comparing the efficacy of different methods. Therefore, randomized controlled trials (RCTs) are recommended in the future to evaluate the real-world effectiveness of individual and combined physical therapy interventions, thereby establishing standardized protocols applicable to military hospitals in field conditions.

6. CONCLUSION

The treatment of musculoskeletal pain using a combination of physical therapy methods at BVDC 2.6 demonstrated a significant reduction in pain at assessment points on days 5 and 10 of therapy. No serious adverse effects were recorded. This suggests that the combined physical therapy protocol is a safe and effective treatment approach, suitable for application in established hospital conditions. However, continued long-term monitoring after treatment and further research with controlled groups are necessary to provide a more comprehensive evaluation of both the efficacy and safety of multimodal physical therapy combinations.

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