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Case Report

The Effect of Provided Exercise Therapy on Cases Morbus Hansen Type Multi Basilers with Reactions: A Case Report

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ABSTRACT

Background: Hansen's disease (Leprosy) is caused by *Mycobacterium leprae* infection and primarily affects the peripheral nervous system. Leprosy reactions, classified as type 1 (reversal) or type 2 (erythema nodosum leprosum), significantly affect sensory, motor, and functional capacities through inflammatory processes. **Objective:** This study evaluated the efficacy of structured exercise therapy in managing multibacillary Hansen's disease in an acute reactional state. **Methods**: A single-case study methodology was employed at Sumberglagah Hospital in Mojokerto, with a focus on a female patient with a leprosy reaction exhibiting movement and functional impairment. Interventions were delivered thrice weekly on alternate days, with protocol modifications on the basis of clinical status. The assessment parameters included the visual analog scale for pain, the Barthel Index for functional status, manual muscle testing for strength, anthropometric measurements for edema, goniometric evaluation for range of motion, and the prevention of disability scale for reaction severity. **Results**: The intervention increased joint mobility in the hip and knee regions and significantly reduced wrist and ankle edema. Pain levels decreased in all the measured domains. However, muscle strength, functional independence scores, and overall leprosy reaction severity did not change throughout the intervention period. The Barthel Index score was maintained at 50, indicating persistent moderate dependency. Manual muscle testing demonstrated consistent values of 3/5 for most muscle groups, with selected ankle movements maintaining 4/5 strength. This severe classification reflects significant neurological involvement, which likely constrains neuromuscular recovery within the brief intervention timeframe. **Conclusion**: Exercise therapy effectively reduces pain, increases joint mobility, and resolves peripheral edema in patients with multibacillary Hansen's disease reactions, despite its limited impact on muscle strength and functional independence within the study timeframe.

KEYWORDS

Morbus hansen, exercise therapy, physiotherapy, biomedical sciences, physical therapy

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INTRODUCTION

Mycobacterium leprae infection, commonly known as Morbus Hansen disease or leprosy, is a chronic infectious condition that significantly affects the peripheral nervous system and skin [1,2]. According to World Health Organization (WHO) reports, Indonesia is the third-largest contributor to the global leprosy burden, following India and Brazil [3]. The Ministry of Health data indicate a concerning trend, with prevalence rates increasing from 0.5 per 10,000 people in 2021 to 0.55 per 10,000 people in 2022. The total caseload reached 12,288 in 2021, with Banten, West Java, and Papua provinces demonstrating the highest burdens [4].

The causative pathogen, *M. leprae,* primarily targets peripheral nerves, resulting in comprehensive neurological dysfunction across sensory, motor, and autonomic domains [5]. The WHO classification system categorizes leprosy into paucibacillary (PB) and multibacillary (MB) forms [6]. The more nuanced Ridley-Jopling classification delineates five clinical presentations: tuberculoid (TT), borderline tuberculoid (BT), borderline-borderline (BB), borderline Lepromatous (BL), and lepromatous (LL). Immunological responses in leprosy manifest as two distinct reaction types: type 1 (reversal reactions) and type 2 (erythema nodosum leprosum) [7].

These inflammatory episodes produce new lesions, exacerbate existing pathology, induce nerve inflammation, and form painful subcutaneous nodules [8]. Neurological manifestations typically begin with sensory dysfunction or paresthesia, followed by progressive nerve damage leading to functional limitations [9]. Dermatological complications include xerosis, which is characterized by cutaneous fissuring at pressure points and skin folds [10]. These inflammatory episodes can occur at any stage before, during, or after antimicrobial therapy, with irreversible disability and deformity representing significant consequences of acute exacerbations [11].

This case study examines physiotherapeutic interventions in a patient with multibacillary leprosy reactions. The treatment protocol incorporates respiratory exercises, active range-of-motion techniques, and edema management strategies designed to enhance muscle function, reduce pain, and prevent secondary complications. Treatment efficacy was monitored via established assessment tools, including the visual analog scale (VAS), manual muscle testing (MMT), anthropometric measurements, and prevention of disability (POD) scoring [5].

Prado et al. [12] reported that while exercise therapy has traditionally focused on preventing complications in diabetic foot conditions, similar approaches have demonstrated efficacy in preventing contractures, paralysis, and other disabilities in leprosy patients. Telrandhe et al. [13] documented successful implementation of modified physiotherapeutic rehabilitation protocols for leprosy-associated nerve lesions, demonstrating improvements in range of motion, sensory function, muscle strength, and functional grasp. This case study contributes to the literature by documenting physiotherapy management strategies for multibacillary Hansen's disease reactions, with outcomes evaluated via prevention-of-disability assessment.

CASE PRESENTATION

A 39-year-old patient with multiple cutaneous nodules, bilateral lower extremity edema, fever, and generalized malaise presented at Sumberglagah Hospital. The patient's history included episodes of visual disturbances when cosmetics were applied. Notably, the current exacerbation occurred following methylprednisolone administration, suggesting an immunological rebound phenomenon that triggered a recurrent Hansen's disease reaction state. The medical history revealed two hospitalizations for leprosy. Upon admission on October 29, 2024, the patient exhibited characteristic manifestations of an active reaction, including pronounced edema and pustular lesions affecting the extremities of the body. The patient's clinical condition necessitated bed rest, and functional activities were significantly impaired. On the basis of the severity of the presentation, a physiotherapy regimen was initiated at a frequency of three sessions per week, tailored to accommodate the patient's general medical status. At the time of assessment, approximately five days postadmission, the patient remained confined to bed with limited capacity for independent functional activities. The ongoing inflammatory reaction was evidenced by persistent extremity swelling and pustular eruptions, indicating an active disease that required comprehensive medical and rehabilitative management.

MATERIALS AND METHODS

Study design and setting

This investigation employed a single-case study design focusing on a female patient diagnosed with multibacillary Hansen's disease, as confirmed by physician assessment and prevention of disability (POD) scoring. The patient presented with movement limitations and functional deficits due to leprosy reactions. All the clinical interactions occurred at Sumberglagah Hospital in Mojokerto, East Java. Data collection was conducted after explicit, informed consent was obtained from the participants. Initial screening was used to determine the appropriateness of physiotherapeutic interventions on the basis of established clinical criteria. The study protocol included a comprehensive explanation of the research aims and objectives, after which the patient's voluntary participation was formally documented [14]. Following enrollment, the treating physiotherapist conducted a detailed anamnesis and physical examination tailored to the patient's specific complaints and clinical presentations. This methodical assessment established the baseline functional status and informed the patient of the subsequent intervention strategy, ensuring alignment with the patient's individual needs and disease manifestations.

Intervention protocol

The treatment protocol was implemented with high intensity for a single patient diagnosed with multibacillary Hansen's disease. The intervention sequence began with the standardized preparation of both the patient and therapist, followed by structured therapeutic exercises (Figure 1).

Figure 1. Intervention protocol in multibacillary Hansen's disease. **Remarks**: (a-b) isometric contraction exercises, (c) active movement exercises, (d) passive movement exercises, (e) edema management, and (f) respiratory therapy.

(a) *Isometric contraction exercises*, the patients were placed in a supine position for these exercises. The participants were instructed to press their knees downward to generate quadriceps muscle contraction. The exercise primarily targeted the lower extremities, with an emphasis on the knee musculature. The sessions lasted for 10 minutes and were performed three times a week.

(b) *Active movement exercises*, with the patient in the supine position, active movement of both the upper and lower extremities was facilitated individually. The protocol incorporated grasping motions, flexion, extension, and other physiological processes. Exercise progression was calibrated according to the patient's tolerance and functional ability. These interventions were conducted three times a week for 10 minutes per session.

(c) *Passive movement exercises*, the patient remained in the supine position, with the therapist positioned beside the treatment surface. The therapist provided manual guidance to facilitate gentle passive movements of the patient's extremities. Both the upper and lower limbs were

addressed in this component. The regimen was consistent with other interventions at three weekly sessions of 10 min each.

(d) *Edema management*, ankle pumping exercises and limb elevation techniques were implemented with the patient in the supine position. Initially, the therapist performed passive ankle movements, transitioning to independent execution when the patient was capable. The specific movements included plantar and dorsal flexion of the ankle. This component maintained the established frequency three times a week for 10 min per session. Patient education included instructions on independent leg elevation for 10–15 minutes via appropriate pillow support.

(e) *Respiratory therapy*, deep breathing exercises were performed with the patient in the supine position. The protocol required the patient to turn their head away from the therapist, who placed their hand on the abdomen at the inferior costal margin. The patient was instructed to inhale deeply, followed by controlled exhalation, while the therapist applied downward and inward abdominal pressure. Tactile cues enhance respiratory effectiveness. This technique emphasizes slow nasal exhalation to complete the respiratory cycle.

Assessment findings

Comprehensive physiotherapeutic examination revealed multiple functional impairments affecting the patient's upper and lower extremities bilaterally. The assessment utilized standardized measurement tools to quantify the severity of the clinical manifestations. Bilateral edema was confirmed in both the upper and lower extremities through anthropometric measurements. Using metric tape measurements, significant circumferential increases were documented at the wrists and ankles, providing objective evidence of an inflammatory response. Goniometric assessment demonstrated restricted joint mobility throughout the upper and lower extremities. These limitations presented bilaterally, indicating widespread functional impairment consistent with the inflammatory nature of the multibacillary leprosy reaction.

Manual muscle testing (MMT) revealed generalized weakness affecting both upper and lower extremity muscle groups. Strength deficits are correlated with limited functional capacity and restricted movement patterns. Pain assessment via the visual analog scale (VAS) revealed significant discomfort, particularly in the elbows and in areas corresponding to edematous tissues [15]. The pain pattern was consistent with the distribution of inflammatory changes characteristic of lepra reactions. The prevention of disability (POD) scale measurement confirmed a severe Hansen's disease reaction with a substantial impact on functional capabilities. This validated the clinical impression of an acute exacerbation that required intensive intervention. The Barthel Index was used to quantify functional independence, demonstrating significant limitations in activities of daily living secondary to the combined effects of pain, edema, restricted mobility, and muscle weakness.

Ethical considerations

The study adhered to ethical guidelines for research involving human subjects, including obtaining informed consent from all participants and maintaining the confidentiality of personal information. Approval for the study was obtained from the relevant institutional review board.

RESULTS

Pain assessment outcomes

The visual analog scale (VAS) demonstrated notable improvements in pain parameters across all measured domains following the intervention protocol implemented over three treatment sessions. Figure 2 illustrates these changes with quantitative precision. Rest pain (silent pain) substantially decreased from an initial score of 4 to a final score of 2, representing a 50% improvement in pain at rest. This significant reduction indicates increased comfort during the inactive period. Movement-associated pain demonstrated the most dramatic improvement, decreasing from a preintervention score of 7 to a postintervention value of 3. This 57% reduction in pain during activity suggests a markedly improved functional capacity and potential for

rehabilitation progression. Tenderness on palpation showed more modest improvement, with scores declining from 7 to 6 points following the intervention. This 14% reduction, while less pronounced than other pain parameters, still represents clinically meaningful progress, given the severity of the inflammatory reaction. These pain reduction patterns suggest differential responsiveness to intervention across various nociceptive mechanisms, with movement-associated pain showing the greatest improvement, whereas tenderness remains more persistent. This information provides valuable guidance for ongoing intervention planning and prognostic discussions.

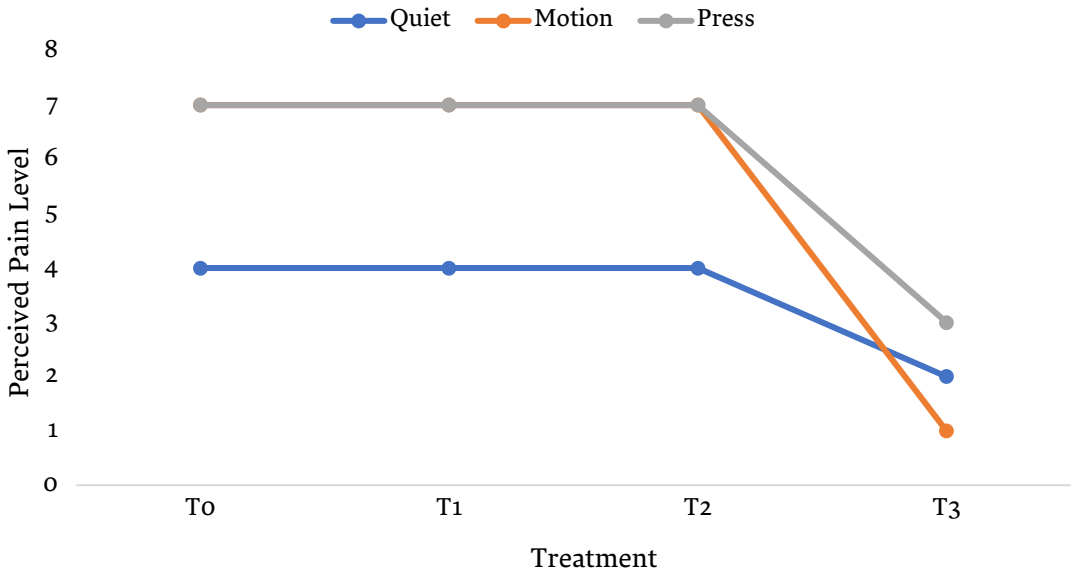

Figure 2. Pain assessment results after the intervention protocol

Muscle strength assessment outcomes

The manual muscle testing (MMT) results presented in Table 1 demonstrate consistent muscle strength values between the initial assessment (T1) and the third treatment session (T3). This finding indicates stability in neuromuscular function throughout the intervention period, despite improvements in other clinical parameters. Upper extremity assessment revealed consistent strength values of 3/5 (movement against gravity) for all elbow and wrist movements bilaterally. Specifically, both elbow flexion and extension-maintained scores of 3/5, as did wrist palmar flexion and dorsiflexion. The results of the lower extremity evaluation revealed similar patterns, with hip and knee movements maintaining 3/5 strength across all planes. Hip flexion, extension, abduction, and adduction all remained at 3/5, as did knee flexion and extension.

Table 1. The manual muscle testing (MMT) results

AGA and AGB Regions	Movement	T1	T3
Elbow	Flexion	3	3
	Extension	3	3
Wrist	Palmar flexion	3	3
	Dorsi flexion	3	3
Hip	Flexion	3	3
	Extension	3	3
	Abduction	3	3
	Adduction	3	3
Knee	Flexion	3	3
	Extension	3	3
Ankle	Plantar flexion	4	4
	Dorsal flexion	3	3
	Inversion	4	4
	Eversion	3	3

The ankle region demonstrated slightly greater baseline strength in select movements, with scores of 4/5 (movement against moderate resistance) for both plantar flexion and inversion movements. These values remained unchanged after the intervention period. Ankle dorsiflexion and eversion-maintained scores of 3/5 throughout the assessment period. The stability of muscle strength values suggests that the three treatment sessions represented an insufficient duration or intensity to produce detectable changes in neuromuscular function. This finding is consistent with the progressive nature of rehabilitation in inflammatory conditions, where pain and edema reduction often precede improvements in muscle strength.

Edema measurement outcomes

The anthropometric evaluation presented in Figure 3 demonstrated clinically significant reductions in peripheral edema following the intervention. The measurements revealed differential responses across the assessed anatomical sites. The right (dextra) wrist exhibited the most pronounced improvement, with a 5 cm reduction in circumference, indicating substantial resolution of the inflammatory exudate. In contrast, the left (sinistra) wrist showed a more modest 1 cm reduction, suggesting variable inflammatory response patterns between the contralateral limbs. Lower extremity measurements revealed that the right ankle maintained a stable circumference of 66 cm throughout the treatment period. However, the left ankle showed meaningful improvement, with a 3 cm reduction in circumference. This asymmetric response mirrors the pattern observed in the upper extremities, with one side showing greater responsiveness to the intervention. These findings indicate that the implemented physiotherapeutic interventions were effective in reducing peripheral edema, although with notable variation in response magnitude between extremities. The greater improvements in the right wrist and left ankle circumferences suggest potential differences in regional inflammatory processes or fluid dynamics that merit consideration in treatment planning.

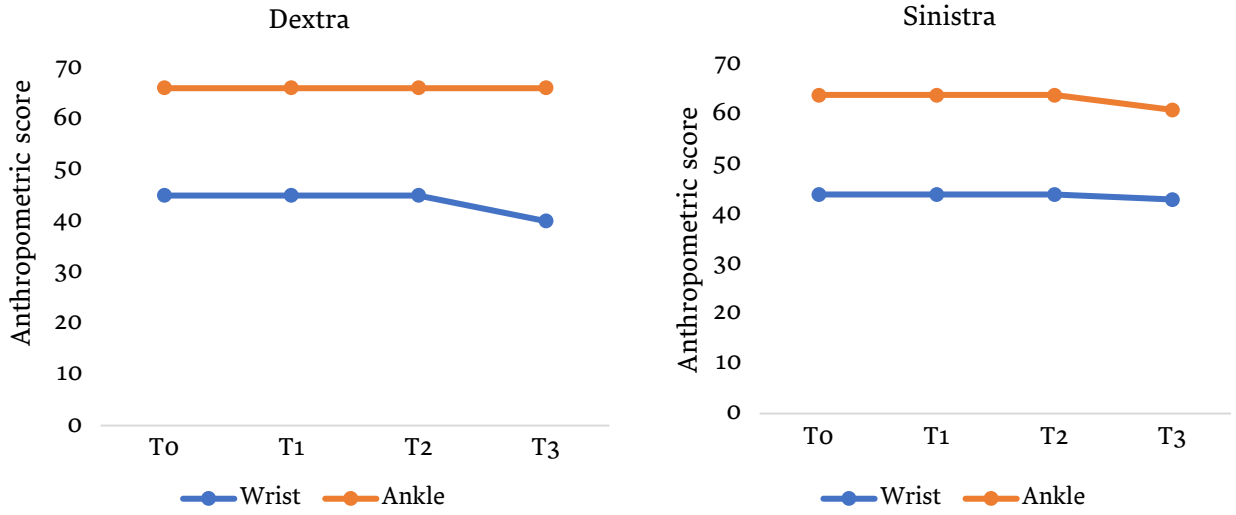

Figure 3. Anthropometric assessment results of the right and left wrist and ankle.

Range of motion assessment outcomes

The goniometric measurements presented in Table 2 demonstrate selective improvements in joint mobility after the three intervention sessions. The response patterns varied notably between the upper and lower extremities. The lower extremity joints exhibited substantial improvements. Hip extension and flexion increased by five degrees bilaterally, with motion ranges ranging from 0–0–105° to 5–0–115° in both the right and left hip joints. This represents a meaningful enhancement in functional mobility for both hip flexion and extension. Knee flexion significantly improved bilaterally, with right knee flexion increasing from 60° to 90° and left knee flexion improving from 75° to 85°. These changes reflect substantial functional gains in key weight-bearing joints. Ankle measurements revealed improved sagittal plane mobility, with dorsiflexion

and plantar flexion ranging from 20°-0°-15° to 30°-0°-20° bilaterally. This improvement in ankle mobility contributes to enhanced gait mechanics and stability. In contrast, the upper extremity joints maintained consistent measurements between the initial and follow-up assessments. The elbow ranges remained at 50°-0°-10° for the right side and 10°-0°-40° for the left side. Similarly, the wrist measurements showed no change, with values of 30°-0°-40° for the right wrist and 30°-0°-35° for the left wrist. Frontal plane measurements for both the hip and ankle joints remained unchanged throughout the intervention period, suggesting that the treatment protocol may have had greater efficacy for sagittal plane movements. These findings indicate a differential response to intervention between the upper and lower extremities, with lower extremity joints demonstrating greater improvements in mobility. This pattern may reflect regional differences in the resolution of inflammation, neuromuscular recovery, or functional adaptation to the intervention protocol.

Table 2. Range of motion (ROM) with a goneometer

Regio	Field		T1	T3
Elbow	Sagital	Dextra	S: 50°- 0°-10°	S: 50°- 0°-10°
		Sinistra	S: 10°- 0°- 40°	S: 10°- 0°- 40°
Wrist	Sagital	Dextra	S: 30°- 0°- 40°	S: 30°- 0°- 40°
		Sinistra	S: 30°- 0°-35°	S: 30°- 0°-35°
Hip	Sagital	Dextra	S: 0°- 0°-105°	S: 5°- 0°-115°
		Sinistra	S: 0°- 0°-105°	S: 5°- 0 °-115 °
	Frontal	Dextra	F: 40°- 0°-30°	F: 40°- 0°-30°
		Sinistra	F: 45°- 0°-30°	F: 45°- 0°-30°
Knee	Sagital	Dextra	S: 60°- 0°-10°	F: 90°-0 °-10°
		Sinistra	S: 75°- 0°-10°	F: 85°- 0°-10°
Ankle	Sagital	Dextra	S : 20°- 0°-15°	S : 30°- 0°-20°
		Sinistra	S: 20°- 0° - 15°	F: 30°- 0°-20°
	Frontal	Dextra	F: 20 °- 0° -25 °	F: 20 °- 0°- 25 °
		Sinistra	F: 20 °- 0 °- 25 °	F: 20°- 0° - 25 °

Prevention of disability assessment

Table 3 presents the prevention of disability (POD) evaluation results, which classified the patients' reactions as severe.

Table 3. Prevention of disability (POD)

Pre			Post		
Description	**Dextra**	**Sinistra**	**Description**	**Dextra**	**Sinistra**
EYE lagopthalmus	No	No	**EYE** lagopthalmus	No	No
HANDS			**HANDS**		
1. Ulnar nerve tenderness	Yes	Yes	1. Ulnar nerve tenderness	Yes	Yes
2. Muscle strength of Vth finger, thumb, wrist	Weak resistance	Weak resistance	2. Muscle strength of Vth finger, thumb, wrist	Weak resistance	Weak resistance
3. Sense of touch			3. Sense of touch		
FOOT			**FOOT**		
1. Peroneal nerve tenderness, posterior tibial nerve.	Yes	Yes	1. Peroneal nerve tenderness, posterior tibial nerve.	Yes	Yes
2. Upper leg muscle strength.	Weak resistance	Weak resistance	2. Upper leg muscle strength.	Weak resistance	Weak resistance
3. Sense of touch.			3. Feeling.		

Inspection conclusion	Inspection conclusion
1. Are there any ruptured patches or ruptured nodules? **Yes**	1. Are there any ruptured patches or ruptured nodules? **Yes**
2. Is there tenderness over the peripheral nerves? **Yes**	2. Is there tenderness over the peripheral nerves? **Yes**
3. Has there been any deterioration in muscle strength before the last six months? **Yes**	3. Has there been any deterioration in muscle strength before the last six months? **Yes**
4. Have there been more than 2 spots of matirasa in the past 6 months? **Yes**	4. Have there been more than 2 spots of matirasa in the past 6 months? **Yes**
5. Has lagopthalamus occurred before the last 6 months? **No**	5. Has lagopthalamus occurred before the last 6 months? **No**
6. Are there active patches around peripheral nerves? **Yes**	6. Are there active patches around peripheral nerves? **Yes**

Functional assessment outcomes

The results of the Barthel Index evaluation presented in Table 4 demonstrate a consistent functional status between the initial assessment (T1) and the third intervention session (T3). The total score remained unchanged at 50 points, indicating persistent moderate dependency in activities of daily living, despite improvements in other clinical parameters. The activity-specific scores were stable across all ten functional domains. The patient required moderate assistance (5 points) for transfers, mobility, toilet use, bathing, dressing, eating, and stair navigation. Full continence was preserved for both bowel and bladder functions (10 points each). Self-care activities remained the most significantly impaired, with the patient unable to independently perform facial hygiene, hair combing, or tooth brushing (0 points).

The sustained moderate dependency classification, despite improvements in pain, edema, and range of motion, suggests several clinical implications. First, functional independence may require more extended intervention periods than the three sessions do. Second, persistent muscle weakness documented in manual muscle testing may represent a rate-limiting factor for functional recovery. Third, the severe inflammatory reaction indicated by the Prevention of Disability scale may necessitate more substantial resolution before functional gains become apparent. These findings emphasize the importance of continued rehabilitation to translate the observed improvements in impairment-level measures (pain, edema, and range of motion) into enhanced functional capacity. A consistent Barthel index score provides valuable prognostic information regarding the anticipated recovery trajectory in multibacillary leprosy reactions.

Table 4. Barthel Index evaluation

Activities	T1	T3
Transfer (sleep to sitting)	5	5
Mobilization (walking)	5	5
Toilet use (going to/from toilet, taking off/putting on pants, wiping, flushing)	5	5
Self-cleaning (face wipe, hair comb, toothbrush)	0	0
Controlling Defecation	10	10
Controlling Urination	10	10
Bathing	5	5
Get dressed	5	5
Eating	5	5
Up and down the stairs	5	5
Score total	**50**	**50**

DISCUSSIONS

This case study examined the effects of a structured physiotherapeutic intervention protocol in a patient with multibacillary Hansen's disease. The three-session intervention, which was delivered at 48-hour intervals, included active and passive movement exercises, isometric training, ankle pumping and respiratory therapy. This comprehensive approach yielded measurable improvements in pain reduction, edema resolution, and range of motion enhancement, although without significant changes in muscle strength or functional

independence. The documented improvements in joint mobility, particularly in the lower extremities, with increases of 5–10 degrees in the hip, knee, and ankle range of motion, align with established therapeutic principles. These gains reflect the capacity of targeted exercise interventions to restore, repair, and enhance physiological and physical function [16]. The exercise protocol appears to improve proprioceptive performance and maintain muscular physiological function, contributing to the observed mobility enhancements.

Despite improvements in several clinical parameters, manual muscle testing revealed no changes in muscle strength throughout the intervention period. This finding warrants consideration in the context of persistent pain and severe inflammatory reactions documented by the Prevention of Disability scale. Both factors likely impede neuromuscular recovery by affecting the sensory and motor pathways. The persistent nature of these findings emphasizes the complex pathophysiology of Hansen's disease and its impact on peripheral nerve function. The structured intervention protocol adhered to established exercise prescription principles, following the frequency, intensity, time, and type (FITT) framework [10]. The program consisted of three weekly sessions conducted every other day, with exercise intensity regulated by an 8-repetition parameter modified according to patient tolerance. This systematic approach contributed to documented clinical improvements, particularly in edema management.

Anthropometric measurements revealed significant decreases in wrist and ankle circumferences by the third intervention session. The effectiveness of ankle pumping techniques combined with lower extremity elevation reflects the physiological principles of enhanced venous return. The gravitational advantage provided by limb elevation coupled with muscle pumping facilitates peripheral fluid mobilization, reducing hydrostatic pressure and improving lymphatic drainage [17]. These mechanisms explain the observed reduction in peripheral edema. Pain modulation was a significant treatment outcome, with improvements across all measured parameters. Rest pain decreased from 4 to 2 points, movement-associated pain from 7 to 3 points, and tenderness from 7 to 6 points. The isometric exercise component likely contributed substantially to these analgesic effects, particularly for the quadriceps muscles [18]. This pain reduction, while clinically significant, did not translate to functional independence improvements within the study time frame. The incorporation of deep breathing exercises served an important preventive function in patients on extended bed rest. This respiratory component enhances pulmonary ventilation [19], potentially increasing lung capacity and preventing immobility-associated respiratory complications [20]. This preventive aspect is an essential component of comprehensive care for patients with severe inflammatory reactions requiring prolonged bed rest.

Clinical implications

The improvements in several aspects, such as decreased pain, decreased edema magnitude, and increased joint motion scope values, indicate that the provision of exercise therapy in cases of Hansen's morbus with a reaction provides an effective modality for patients with multibacillary-type Hansen's morbus with a reaction. Changes were observed from T0--T3, which revealed significant positive changes in the provision of exercise therapy. In some aspects, there has been no change, which is factored in by the severe reaction of leprosy, which has a disruptive effect on sensory and motor performance.

Limitations

In this study, no modality intervention was applied to cases of morbus Hansen accompanied by such reactions. The short duration of the study necessitates further evaluation of the interventions. The author hopes that further research will provide interventions over a longer period to determine the level of change in the maximum effectiveness of interventions.

CONCLUSIONS

The assessment findings demonstrated measurable improvements in several clinical parameters. Joint mobility increased in the hip, knee, and ankle regions, with documented range-of-motion gains. Pain levels decreased across all the measured domains, as evaluated via the

visual analog scale (VAS). Anthropometric measurements of the wrists and ankles revealed significant reductions in peripheral edema. Despite these improvements, muscle strength and functional independence remained unchanged throughout the intervention period. The Barthel Index score was maintained at 50, indicating persistent moderate dependency. Manual muscle testing demonstrated consistent values of 3/5 for most muscle groups, with selected ankle movements maintaining 4/5 strength. The limited response in terms of muscle strength and functional capacity is attributable to severe inflammatory reactions, as confirmed by the prevention of disability assessment. This severe classification reflects significant neurological involvement, which likely constrains neuromuscular recovery within the brief intervention timeframe. This case demonstrates that structured exercise therapy can produce meaningful clinical improvements in pain, edema, and joint mobility, even during acute inflammatory reactions in patients with Hansen's disease. However, the findings also highlight the necessity of extended intervention periods to achieve substantial gains in muscle strength and functional independence in patients with severe multibacillary reactions.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

AUTHOR CONTRIBUTIONS

Conceptualization: FNR, AP, WWC; Methodology: FNR; Software, Validation: FNR, WWC; Formal Analysis and Investigation: FNR; Resources: FNR, WWC; Data Curation, Writing - Original Draft: FNR. Writing - Review & editing: FNR, AP; visualization: FNR; supervision: AP, WWC.

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