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PHYSIOTHERAPY PROGRAM ON CLAW HAND CONDITION AT LEPROSY HOSPITAL KELET DONOREJO: A CASE STUDY

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Abstract

***Introduction**:* Leprosy or known as Morbus Hansen's disease is a bacterium that attacks skin tissue, peripheral nerves, and respiratory tract in humans under the name Mycobacterium leprae. Fourteen countries including Indonesia conducted data collection on cases of leprosy in the world with a total of 199,992 people in 2015 and 17,202 people in Indonesia. Most people with leprosy experience ulnar nerve paralysis which causes partial disruption of the fingers.
Case Presentation: Patient S, 21 years old, complains of swelling of the hands and itching and fever. The patient reported numbness in the left hand and difficulty moving the 4th and 5th fingers of the left arm. In January 2021 the doctor recommended taking multi drug therapy (MDT), after taking it the patient had a severe reaction with nodules appearing in several areas.
Management and Outcome: Physiotherapy performed an IPPA examination (inspection, palpation, percussion, auscultation), the results were thickening of the left ulnar nerve, the skin surface felt dry and rough. physiotherapy also performs pain assessment using a numerical rating scale (NRS), muscle strength examination using manual muscle testing (MMT), examination of joint range of motion with a goniometer, examination of motor nerve function and nerve palpation with POD, and examination of functional ability of the hand using a wrist hand. disability index (WHDI).
***Discussion**:* The physiotherapy program carried out for claw hand patients aims to increase the range of motion of the joints, increase muscle strength, and increase the patient's functional activities.
***Conclusion**:* The physiotherapy program for 7 meetings on claw hand conditions at the Leprosy Hospital Kelet Donorojo, Jepara in the form of stretching, strengthning, and functional exercises can increase the range of motion of the joints, there has not been an increase in muscle strength and functional in the patient, although in the range of joint motion which increases, the results are not significant.

Keywords: Leprosy, Morbus Hansen, Myiobacterium Leprae, Claw hand, Physiotherapy rehabilitation

Introduction

Leprosy or known as Morbus Hansen's disease is a bacterium that attacks skin tissue, peripheral nerves, and respiratory tract in humans with the name Mycobacterium leprae. (Tongluan *et al*., 2021). One of the damage caused by Mycobacterium leprae is damage to peripheral nerves which can cause reduced sensory function, muscle contractures, and muscle weakness.(Jawade, 2020). the nerves that are often problematic as a result are the auricularis magnus, radialis, ulnar, peroneus, tibialis posterior (Cabral *et al*., 2022). Fourteen countries including Indonesia conducted data collection on cases of leprosy in the world with a total of 199,992 people in 2015 and in Indonesia as many as 17,202 people (Kemenkes RI, 2018).

Most people with leprosy experience ulnar nerve paralysis which causes disruption of part of the fingers (Sajid *et.al,* 2022). As a result of ulnar nerve paralysis usually causes a person difficulty in moving the fifth finger metacarpal flexion, then unable to move the abduction and adduction of the fourth and fifth fingers, if this situation is left alone it will affect the decrease in muscle strength and range of motion of the joints in the finger and causes hyperextension of the metacarpophalangeal (MCP) with the name claw hand where the finger is like a bird's claw (Chan *et al*., 2019). In the claw hand condition, the hand cannot grip large objects because it cannot take the initial position of flexion of the metacarpophalangeal (MCP) joints and extension of the interphalangeal (IP) joints. The gripping and pinching strength of the affected finger is reduced (Sajid *et.al,* 2022).

Leprosy is classified into 2 types, namely paucibacillary (PB) if there are less than 5 thickened spots or lumps and Multibacillary (MB) if there are more than 5 thickened spots or lumps almost all over the body (Alemu Belachew & Naafs, 2019). Until now, there are several treatments for leprosy, namely multidrug therapy (MDT). Multi drug therapy is the main treatment for leprosy using rifampin, dapsone, and clofazamine. According to his research, MDT can be given to paucibacillary and multibacillary leprosy (Maymone *et al*., 2020).

Damage to the ulnar nerve causing the finger to grip like a claw may necessitate surgery such as preventive peripheral nerve surgery and repetitive tendon transfer surgery. Both procedures and surgery must be reconsidered to ensure comprehensive treatment in the future and of course this advice is carried out according to the severity of one of which has a deformity in the hand that requires surgery (Neto *et al*., 2018).

Treatment can also be done by physiotherapists by giving exercise programs to patients, some exercises that can be done are doing full range of motion, grasping, picking up small objects such as seeds, holding large objects such as cups or glasses, and other functional exercises. The pinching action is also weak in pure ulnar nerve palsy so that when picking up objects with the index finger and thumb develops due to muscle weakness (Sajid *et.al*, 2022). Stretching techniques can be used to prevent muscle shortening, increase muscle strength with strengthning exercises to restore grip function. In this case, modified physiotherapy rehabilitation assistance in regaining sensation, joint range of motion and hand muscle strength early and restoring functional activity (Jawade, 2020)

The claw hand condition causes several problems in the arm, such as decreased range of motion and muscle weakness. To minimize these problems, physiotherapy provides action in the form of exercises with the aim of increasing the range of motion of the joints and restoring muscle strength.

Case Presentation

Subjective Examination

Patient S, 21 years old, complained of swelling of the hands and itching and fever. The patient reported numbness in the left hand and difficulty moving the 4th and 5th fingers of the left arm. In January 2021 the doctor recommended taking multi drug therapy (MDT), after taking it the patient had a severe reaction with nodules appearing in several areas. At the age of 17 the patient had complained of similar things such as red patches on his back and was examined but the diagnosis at that time was only ordinary itching. When experiencing complaints in October 2021, the patient was diagnosed with multi-bacillary morbus Hansen and underwent treatment at the Donorojo Leprosy Hospital, Jepara.

Physical Examination

Physiotherapist performed IPPA examination (inspection, palpation, percussion, auscultation) on inspection, the results were static inspection of open sores on the 2nd and 4th fingers on the right hand, dry skin, and blackish red nodules on the left hand and dynamic inspection for muscle weakness 4th and 5th fingers on the left, it seems difficult to pick up small objects using 4th and 5th fingers. On palpation, the results were a thickening of the left ulnar nerve, the skin surface felt dry and rough. Percussion and auscultation were not performed. In addition to conducting IPPA examinations, physiotherapists also perform pain assessments using a numerical rating scale (NRS), muscle strength examinations using manual muscle testing (MMT), joint range of motion examinations with a goniometer, motor nerve function examinations and nerve palpation with POD, and functional ability examinations. on the hand using the wrist hand disability index (WHDI).

Management and Outcome

The physiotherapy process was carried out to patients while undergoing therapy at the rehabilitation poly at the Leprosy Hospital Kelet Donorojo. The purpose of providing intervention to claw hand patients is to reduce pain, increase muscle strength, increase joint range of motion, and improve the patient's functional ability.

In this study, interventions were given: Stretching, Strengthening, Functional exercise

Examination POD

	Dextra	Sinistra
Facial		
Menutup Mata	5	5
Ulnar		
Abduksi jari kelingking	5	3-
Abduksi jari telunjuk	5	3-
Posisi intrinsik (4,5)	5	1
Posisi intrinsik (2, 3)	5	4
Median		
Abduksi Ibu jari	5	4
Oposisi ibu jari	5	5
Radial		
Extensi wrist	5	5

Tabel 1. motor nerve function

On examination in table 1. Motor nerve function was found to be decreased in the left side. In the abduction movement of the little finger the patient can only contract and fight gravity with a strength value of -3. In adduction movement the patient's index finger is only able to contract and fight gravity with a strength value of -3. In the intrinsic position (4,5) the patient is only able to contract the finger with minimal movement. In the intrinsic position (2,3) the patient is able to move and resist minimal resistance with a strength value of 4. In thumb abduction the patient is able to move and resist minimal resistance with a strength value of 4.

Examination POD

Dextra		Nerve	Sinistra	
Nyeri	Raba		Nyeri	Raba
-	N	Auriqularis magnus	-	N
-	N	Radialis	-	N
-	T	Ulnaris	-	T
-	T	Peroneus	-	T
-	N	Tibialis posterior	-	N

Tabel 2. Nerve palpation

On examination of the palpation of nerves, the patient found thickening of the right and left ulnar and peroneus nerves in the patient, plus there was pain when palpated in the thickened part.

The results of increasing muscle strength using Manual Muscle Testing (MMT)

Movement	Dekstra		Sinistra	
	T1	T7	T1	T7
Palmar Fleksi	5	5	5	5
Dorsal Fleksi	5	5	5	5
Radial Deviasi	5	5	5	5
Ulnar Deviasi	5	5	5	5
Metacarpo phalangeal jari ke 5	5	5	1	1
Metacarpo phalangeal jari ke 4	5	5	1	1
Metacarpo phalangeal jari ke 3	5	5	5	5
Metacarpo phalangeal jari ke 2	5	5	3	3
Metacarpo phalangeal jari ke 1	5	5	5	5

Tabel 3. Results of muscle strength using manual muscle testing

After doing exercises in the form of stretching, strengthning, and functional exercise for 7 times, no increase in muscle strength was found in the metacapophalangeal fingers of the 2nd, 4th and 5th left fingers.

Results of joint range of motion using a goniometer

Gerakan Wrist	Sinistra	
	T1	T7
Palmar fleksi – Dorsal Fleksi	75º – 0º – 70º	75º – 0º – 70º
Radial Deviasi – Ulnar Deviasi	20º – 0º – 30º	40º – 0º – 35º
Ekstensi – Fleksi Thumb	45º – 0º – 35º	45º – 0º – 40º
Ekstensi – Fleksi jari 2	40º – 0 º – 50º	40º – 0º – 50º
Ekstensi – Fleksi jari 3	35º – 0º – 45º	35º – 0º – 45º
Ekstensi – Fleksi jari 4	20º – 0º – 50º	30º – 0º – 60º
Ekstensi – Fleksi jari 5	25º – 0 º – 55º	25º – 0º – 55º

Tabel 4. Results of joint range of motion using a goniometer

The results of the patient's joint range of motion after exercise 7 times, evaluation measurements were carried out at the 7th meeting with the results of an increase in the range of motion of the joints in the radial movement-ulnar deviation deviation by 5 degrees, thumb extension-flexion as much as 5 degrees, and extension-flexion 4th finger by 10 degrees.

Results of hand functional ability using the wrist hand disability index (WHDI)

Score Wrist Hand Disability Index (WHDI)	
T1	T7
14%	14%

Tabel 5. The results of the functional ability of the hand using the wrist hand disability index (WHDI)

Skor: amount / 50 x 100% = 5% (Minimal disability)

SKOR	Degree of Disability / Addiction
1-20%	*Minimal disability*
20-40%	*Moderate*
40-60%	*Severe disability*
>60%	*Severly disability in several area of life*

The results obtained in measuring the functional ability of the hand using the wrist hand disability index (WHDI), it has not been found that there is an increase in the functional aspect.

Discussion

The physiotherapy program carried out for claw hand patients aims to increase the range of motion of the joints, increase muscle strength, and increase the patient's functional activities. Stretching aims to increase the range of motion of the joint, keeping the patient from increasing stiffness or contractures. Strengthning aims to increase the strength of the fingers that experience weakness. Functional exercise aims to help the patient to be able to perform movements or activities that involve the hands and fingers independently.

Patients with complaints of claw hand due to lesions on the ulnar nerve can be given stretching and strengthning to increase the range of motion of the joint and maintain muscle shortening and increase muscle strength in the patient. (Jawade, 2020). Functional exercise aims to improve the function of holding someone, the exercise is carried out in a variety of ways starting from holding glasses or other objects that can be used (Hoffman *et al*., 2012).

Conclusion

The physiotherapy program for 7 times on claw hand conditions at the Kusta Kelet Hospital Donorojo, Jepara in the form of stretching, strengthning, and functional exercises can increase the range of motion of the joints, there has not been an increase in muscle strength and functional in the patient, although the increased range of joint motion is obtained. the results are not yet significant. The absence of a significant improvement could be due to the short duration of physiotherapy meetings in the study period.

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