**MEDICAL REHABILITATION IN PATIENT WITH PARKINSON**

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**ABSTRACT:**

Parkinson is a clinical syndrome that is maniftesed specifically with parkinsonism: bradikinesia, hipokinesia/akinesia, rigidity, tremor, and postural imbalance, caused by striatal dopaminergic denervation. Prevalence studies in China and Taiwan, which have similar genetic backgrounds but different levels of industrialization, have different ranges of 14.6 and 119 per 100,000. Parkinson's prevalence also shows similar results in different ethnic populations (Chinese, Malay, and Indian) in Singapore which is a multiethnic population. Parkinson disease presents with four cardinal motor manifestations: tremor at rest, rigidity, bradykinesia (or slowing of movement), and postural instability. Not all patients initially present with all of the classic signs of the disorder; Medical treatment aims to increase the action of dopamine and reduce the effects of cholinergic. Despite optimal medical treatment and neurosurgical interventions, patients develop progressive disability.23 The role of rehabilitation in parkinson disease is to maximize motor and cognitive functional abilities and minimize secondary complications in order to optimize independence, safety, and well-being, thus enhancing quality of life.

**KEY WORDS:** Bradikinesia, parkinson, rehabilitation, rigidity.

**ABSTRAK:**

Parkinson adalah suatu sindrom klinis yang dimanifestasikan secara spesifik dengan parkinsonisme: bradikinesia, hipokinesia/akinesia, rigiditas, tremor, dan ketidakseimbangan postural, yang disebabkan oleh denervasi dopaminergik striatal. Studi prevalensi di Cina dan Taiwan, yang memiliki latar belakang genetik yang sama tetapi tingkat industrialisasi yang berbeda, memiliki kisaran yang berbeda yaitu 14,6 dan 119 per 100.000. Prevalensi Parkinson juga menunjukkan hasil yang sama pada populasi etnis yang berbeda (Cina, Melayu, dan India) di Singapura yang merupakan populasi multietnis. Penyakit Parkinson muncul dengan empat manifestasi motorik kardinal: tremor saat istirahat, kekakuan, bradikinesia (atau perlambatan gerakan), dan ketidakstabilan postural. Tidak semua pasien awalnya datang dengan semua tanda klasik dari gangguan tersebut; Perawatan medis bertujuan untuk meningkatkan aksi dopamin dan mengurangi efek kolinergik. Meskipun perawatan medis dan intervensi bedah saraf yang optimal, pasien menunjukan kecacatan progresif.23 Peran rehabilitasi pada penyakit parkinson adalah untuk memaksimalkan kemampuan fungsional motorik dan kognitif dan meminimalkan komplikasi sekunder untuk mengoptimalkan kemandirian, keamanan, dan kesejahteraan, sehingga meningkatkan kualitas kehidupan.

**KATA KUNCI:** Bradikinesia, Parkinson, rehabilitasi, rigiditas.

**INTRODUCTION**

Parkinson is a clinical syndrome that is maniftesed specifically with parkinsonism: bradikinesia, hipokinesia/akinesia, rigidity, tremor, and postural imbalance, caused by striatal dopaminergic denervation.1 Parkinson is a degenerative disease of the nervous system that affects the brain.2 The disease is chronic, usually slow progressive.3

Prevalence studies in China and Taiwan, which have similar genetic backgrounds but different levels of industrialization, have different ranges of 14.6 and 119 per 100,000. Parkinson's prevalence also shows similar results in different ethnic populations (Chinese, Malay, and Indian) in Singapore which is a multiethnic population.4 The incidence of this disease increased with age, from 17.4 per 100,000 population in the 50-59 year age range and 93.1 per 100,000 population in the age range 70-79 years. Age of onset is 60 years and the average duration of illness from diagnosis to death is 15 years. The cause of death is usually difficult to identify in most cases, but pneumonia is the most common cause.5

Idiopathic Parkinson's disease is a disorder of the basal ganglia in which cells in the substantia nigra and locus ceruleus are reduced, where dopamine is produced, and degeneration of the nigrostriatal pathway (from the substantia nigra to the corpus striatum). This causes a decrease in dopamine in the corpus striatum. Reduced dopamine can result in reduced inhibitory input in the cholinergic system (causing excessive excitatory output).

Parkinson disease presents with four cardinal motor manifestations: tremor at rest, rigidity, bradykinesia (or slowing of movement), and postural instability. It is important to note, however, that the clinical diagnosis of parkinson disease is made on the basis of a medical history and neurologic examination; there is currently no laboratory test that can definitely establish a diagnosis. Even neuroimaging, which can be used to obtain an estimate of dopamine loss is imperfect and in any event is too expensive to be used as a routine diagnostic tool.

Medical treatment aims to increase the action of dopamine and reduce the effects of cholinergic. 5. There is no cure for parkinson disease and pharmacological treatment (of which levodopa is the long-term gold standard) still lacks significant effects on the previously described harmful symptoms.

Despite optimal medical treatment and neurosurgical interventions, patients develop progressive disability.23 The role of rehabilitation in parkinson disease is to maximize motor and cognitive functional abilities and minimize secondary complications in order to optimize independence, safety, and well-being, thus enhancing Quality of life

**CASE REPORT**

A case of man with complaints of spontaneus movements in both arms and a feeling of imbalance when walking has been reported. This movement arises on both arms and also on the fingers. This movement is like trembling, it has begun to be felt since about 7 years ago. According to the patient, from the beginning it was felt in both arms but only in the form of smooth movements and in last 3 years the movement was more pronounced. Movement arises spontaneously when the patient is resting and decreases if the patient moves the arm, movements like this also sometimes feel in both legs.

Other symptoms are felt stiffness throughout his face, body and extremity that made movement limitation. He felt like falling down and difficult to turn 3600 when walking. There is no cognitive disturbance, Patient has adequate orientation to person, place, time and situation. He has a good memory and judgment, as well as capacity of abstract thought. He Disturbances on activity daily lives in the form of disturbances in writing, dressing,toiletting,eating, and bathing but still fully independent with slow movement. No swallowing disturbances.When in bed for lying on his left or right side, he can still do it without being disturbed. No Disturbances in bladder and bowel.

On admission he was alert, her vital sign within normal limit and his BMI was 24,34 kg/m2 (normal), chest expansion measurement from maximal inspiration to maximal expiration on axillaris, papillae mammae, and procesus xhypoideus was 87,5-85 cm, 82,5-80 cm, and 82-79cm, respectively. In posture examination we found thoracal kyphotic (+), shoulder rounded (+).

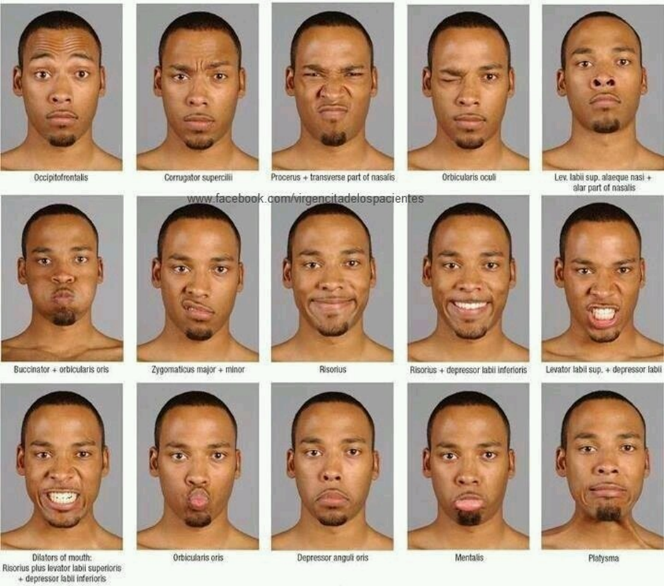
On gait analysis there were average initial contact and loading response, average midstance, average terminal stance, heel strike and push off (heel off and toe off) in stance phase, average time

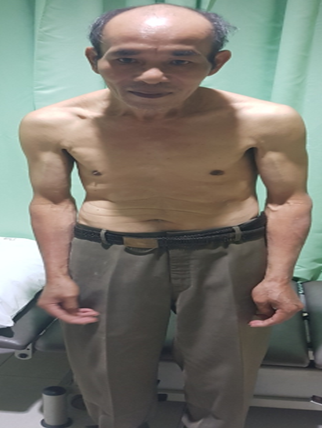
for preswing, initial swing, midswing and terminal swing in swing phase. On neuromuscular status we found cogwheel rigidity was positive in upper extremity, decreased movement in upper and lower extremity, increased muscle tone in upper and lower extremity.



Manual Muscle Test Facialis

|  |  |  |
| --- | --- | --- |
| Muscles | Right | Left |
| Frontalis | 1 | 1 |
| Corrugator supercilli | 2 | 2 |
| Procerrus | 2 | 2 |
| Orbicularis occuli | 3 | 3 |
| Zygomaticus mayor | 1 | 1 |
| Buccinators | 2 | 2 |
| Orbicularis oris | 2 | 2 |





Barthel Index Scoring :

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Activity | Score | Normal Score |
| 1. | Feeding | 10 | 10 |
| 2. | Bathing | 5 | 5 |
| 3. | Grooming | 5 | 5 |
| 4. | Dressing | 10 | 10 |
| 5. | Bowels | 10 | 10 |
| 6. | Bladder | 10 | 10 |
| 7. | Toilet use | 10 | 10 |
| 8. | Transfers (bed to chair and back) | 15 | 15 |
| 9. | Mobility (on level surfaces) | 10 | 15 |
| 10. | Stairs | 5 | 10 |
|  | Total | 90 |  |

Score Barthel index :90 (moderate dependent)



Functional Examination

Mobility activities

* Supine to side-lying : independent
* Lying to sitting : independent
* Shifting on sitting : independent
* Sitting to standing : independent
* Shifting on standing : independent
* Walking (gait pattern) :independent (parkinsonian gait)

**REHABILITATION PROGRAM**

This patient had some rehabilitation problems, include: masking face (hypomimic), rigidity of both hand, limitation in activity of daily living (writing,eating,walking,dressing,toiletting), postural instability (thoracal kyphotic, shoulder rounded), balancing disturbance, transfer and



mobilization disturbance and abnormal gait (parkinsonian gait)

Comprehensive rehabilitation management we

given for this patient, include:

* Breathing exercise ; pursed lip breathing and diaphragm breathing
* Chest wall mobilization
* *Massage* dan facial muscle exercise.
* AROM exercise right and left shoulder, elbow, and wrist.
* Stretching exercise at superior extremity and shoulder bilateral (scapular retraction)
* Strengthening exercise major muscle group
* Postural control exercise
* Frenkel exercise (Balance exercise)
* Gait training

She was scheduled for evaluation every week,

and on the fourth week, there was significant improvement for hypomania, rigidity at both hand, chest expansion, posture, ADL disturbance, balance disturbance and abnormal gait pattern.

**DISCUSSION**

The cause of Parkinson’s disease is still the subject of research, it may be multifactorial, but several factors are suspected such as genetics, exposure from environmental factors (pesticides), and head trauma12. From anamnesa of the patient there is no definite cause of parkinson disease found.

From the anamnesa, the spontaneus movement of both hands and finger from the patient felt since about 7 years ago. this movement according to the patient has been felt from the beginning on both arms but only in the form of subtle movements but in the last 3 years the movement is more felt, movements arise spontaneously when the patient is resting and decreases if the patient moves his arms, movements like this also sometimes felt on both leg. In the literature mentioned tremor, usually on the hands, usually on one side can occur in the initial conditions. Tremor at rest is one of the most characteristic features of the disease, occurring in 70% of patients. Whereas it is not required for diagnosis, the prolonged absence of tremor in the course of a patient’s illness should lead to the careful consideration of other neurologic conditions that can present with signs of parkinsonism, including the multiple system atrophies, progressive supranuclear palsy, corticobasal ganglionic degeneration, and others.29 Tremor generally at rest or after walking. Handwriting changes (being small) can also be found. Tremor at rest rarely occurs in other conditions. Tremor is slow and rhythmic. Usually starting in one hand then it can also be on the other hand. Sometimes more visible tremors can be seen in the legs or feet from the affected side. The lips and chin can also vibrate. This tremor usually decreases or disappears after directed movement. In some patients, tremor can occur when the arm is stretched (postural or sustention tremor) or when performing various movements (action tremor). This tremor if mild rarely limits the functional but can interfere with certain functions such as eating soup or drinking from a full cup.3 In patients with tremor in the arm it is disturbing in daily life activities such as eating soup,toiletting, bathing. patient also feel disturbed when writing and dressing.

Rigidity is a motor sign more often appreciated by the examining physician than the patient; it is detected as a resistance to passive movement of the limbs. It is often uniform in directions of flexion and extension but there may be a super imposed ratcheting (cogwheel rigidity). From the patient found limitation ROM of upper extremity at shoulder, elbow,wrist and also cogwheel rigidity at both hand. In the examination, patient couldn’t do full ROM at both hand, but passively can achieve normal values

From the history of of the patient, he also complained of fear of walking because it was like he want to falling down. Problems with balance and their impact on posture usually occur later and are a cause of disability. Postural instability is the most potentially dangerous,30 because it can lead to falls with resulting fractures. It is also one of the manifestations that responds less well to levodopa therapy. Tremor may also be less responsive, even early in the course. An additional motor feature of parkinson disease is the freezing phenomenon, also referred to as ‘‘motor block’’. In its most typical form, freezing occurs as a sudden inability to step forward while walking. It may occur at the beginning at a turn, or just before reaching the destination. It is transient, lasting seconds or minutes, and suddenly abates. Combined with postural instability, it can be Patients usually complain of feeling dizzy which is an expression of a disturbed balance. The inability to maintain an upright posture or corrective action to prevent falls can actually lead to falls. In this patient found some postural instability such as kyphotic posture with both shoulder rounded and freezing gait which showed abnormal gait walking pattern from patient.

Patients also feeling stifness when writing, and his writing can’t be read. Bradykinesia in Greek means slow motion, a feature of parkinsonism. Bradykinesia is not due to limb rigidity; it can be observed in the absence of rigidity during treatment. When bradykinesia affects theoropharynx, it can lead to difficulties in swallowing, which in turn may cause aspiration pneumonia, a potentially life-threatening complication of the cardinal motor signs.30 In this scope there are many signs and symptoms that can exist, such as the expression like a mask (hypomimia) with reduced eye blinking, slowness in starting movements, decreased motor coordination (difficulty in buttoning shirt). The difficulty of turning around in bed is also a sign of bradykinesia, including handwriting problems being slow and small (micrographia) . 3 For now the patient has not felt any disturbance in ability to lie on his side left or right while in bed.

Balance measurement using Berg Balance Scale. Balance is one of the few constructs that may have predictive value for early walking recovery. The Berg Balance Scale (BBS) is one of the most widely used and recognized balance measures.20 The BBS has been validated in several populations, including stroke, and cut-off scores have been determined to identify those at risk of falls and those who need a gait aid for ambulation . The BBS is commonly applied during inpatient rehabilitation, and has been shown to predict length of stay and discharge destination . It would be further useful for clinicians if specific values of the BBS were identified that predict whether patients will go on to walk without needing physical assistance or at speeds suitable for the community. The BBS is an ideal measure for this purpose, as it can be administered to patients who have very low function as well as those with preliminary ambulatory abilities.20 BBS has 3 category : Sitting balance with one component, Standing balance with nine component, and Dynamic balance with five component. The score result indicating : risk of falling is low (41-56), risk of falling is moderate (21-40), risk of falling is high (0-20)

The ability to walk for a distance is a quick and inexpensive performance based measure, and component quality of life, since it reflects the capacity to undertaken day to day activities. Six Minutes Walk Test (6-MWT) is common used to assesse exercise capacity in patient to track functional change resulting from disease progression or therapeutic intervention. Test to assess aerobic endurance, which is important for walking distance, stair climbing, shopping, sightseeing while on vacation, etc.27 In this patient, assessment for cardiorespiration endurance was done using 6-MWT. Six-MWT was performed on the 2nd visit to the clinic. Patient was able to achieve total of 425 meters, with O2 saturation 97%, VO2max = 15,74 and METs = 4,49

Reduced function can occur even before the diagnosis of Parkinson's is established. Early symptoms can be vague and nonspecific, such as unexplained fatigue, mild cramps, which can contribute to increasing disability. Its impact on cognitive, especially affecting executive function and memory, can also be found in 25% of patients newly diagnosed with Parkinson's. Excessive fatigue both mentally and physically can be found and indirectly decreases the quality of life. Depression can add to problems and affect patient participation in activities. In the development of the disease, clinical symptoms and signs, including tremors that can result in the spilling of food or drink, difficulty speaking, reduced facial expressions and the possibility of drooling, which can lead to shame in individuals and a feeling of isolation. Difficulties in starting motion such as walking and freezing in the social environment can affect independence and self-confidence.8

From the clinical picture and physical examination obtained, the patient can be categorized as stage III. The course of the disease according to Hoehn and Yahr namely:7

* Stage I: Sign and symptoms on one side only; tremor of the limb; minute change in posture, locomotion, and facial expression.
* Stage II: there are bilateral symptoms, there is minimal disability, posture and gait affected.
* Stage III: slowing of body movement; early
* impairment of equilibrium on walking or sliding; generalized dysfunctions.
* Stage IV: there are more severe symptoms, can still walk to a limited extent, rigidity and bradykinesia, unable to live alone, tremors may be less than in earlier stage.
* Stage V: Cachetic stage, total disability, can

not stand or walk, requires constant nursing

* care.

The literature states that the results of Parkinson's laboratory tests can show normal results.10 From the laboratory examination found normal result. And from the spirometri examination found result normal spirometri.

From the anamnesis and physical examination as well as existing investigations, the patient is diagnosed as stage III Parkinson's disease with Activity Dailing Living functional disorders (writing, dressing), abnormal gait and mobility, balance disorders, psychological disorders (anxiety). With problems in rehabilitation include: Decreased motor skills in ADL such as writing difficulties, difficulty in standing, postural instability, gait disorders (road pattern), in ADL requires mild assistance, anxiety with illness, depression, lack of activity (immobilization)

In physiotherapy evaluation muscle tone is obtained and normal muscle strength, limitation range of motion and kyphosis posture, hypomimia, transfer and mobilization disorders, ambulation disorders, posture kyphosis, postural disorders, abnormal gait. Patients are given Chest rehabilitation programs, massage and exercise of facial muscles, LGS improvement exercises, relaxation exercises, stretching and strengthening, posture control, balance exercises,gait exercises. Physical exercise will not inhibit Parkinson's progression but can improve quality of life. Some studies show Parkinson's sufferers who do physical exercise can live life better than those who don't do physical exercise. Parkinson's sufferers need physical exercise to prevent the negative effects of slowing movements. Secondary effects that can arise in the form of:17

* Postural instability
* Decreased range of motion (loss of flexibility).
* Decreased of muscle strength, especially the muscles that support to erect.
* Decrease of resistance (tired quickly)
* Balance disturbance.

The breathing exercises given aim to increase oxygen intake into the body and overcome stiffness in the area around the chest. Pursed lip breathing significantly decrease respiratory rate and increased tidal volume. Pursed lip breathing involves breathing patterns that can be combined with upper limb and trunk movements, as well as thoraciccage maneuvers. These exercises aim to improve the patient’s breathing pattern and increase lung expansion, respiratory muscle strength, functional residual capacity, and inspiratory reserve volume.17 For chest wall mobilization are combined with active movement of the trunk or extremities with deep breathing,and followed by stretching exercise at upper extremity. This exercise aims to maintain or improve mobility of the chest wall, shoulder girdles and trunk. To mobilize the upper chest and stretch the pectoralis muscle. In sitting position ask the patient to clasped his hand behind the head and abduct his arms horizontally, during a deep inspiration.17 From this patient at first day he came to poly of medical rehabilitation found decrease of chest expansion (2,5-2,5-3 cm) and after did routine exercise, his chest expansion seems to have improved (3,5-4-3,5 cm)

Massage on the face and facial muscle exercise aims to overcome hypomimia in the muscles around the face. Exercises for the facial muscle groups can help to retain muscle integrity and the range of motion in the face and mouth and helping the range of facial expressions. Massage, which has frequently been prescribed for facial palsy, improves circulation and may prevent contracture. The guideline for soft tissue massage was 10 repetitions 1 or 2 times per day. From this patient at first day he came to poly of medical rehabilitation found decrease of mmt fascialis and there is an increase after he did routine massage dan fascialis muscle exercise.From this patient found stiffness with limitation ROM at both hand (elbow,

shoulder,and wrist). Studies have shown that people with mild Parkinson’s who engage in flexibility exercise training improve their joint range of movement to a similar degree as healthy age matched controls. the advantage of stretching is :18

improve flexibility, stamina and muscle strength, reduce muscle pain, good muscle and joint mobility,good range of motion,improve performance.

In this patient given AROM exercise and stretching at both upper extremity (flexion/extension elbow, flexion/abduction shoulder, flexion/extension wrist) and from last follow up found slightly increasing ROM at both hand.

Strengthening is a type of physical exercise, especially in using resistance to induce (cause) muscle contractions which form the strength and size of skeletal muscles. Strengthening can provide benefits such as: increasing the strength of bones, muscles, tendons and ligaments; improve joint function; reduce the potential for injury; increase bone density; increase metabolism; improve heart function.19 Several observations suggest that resistance training may facilitate functional plasticity in the cortex and muscle activation patterns. For this reason, in Parkinson disease patients, this kind of training could be therapeutic to modify the activity in the cortex and basal ganglia, as well as the connectivity between and within these structures. Indeed, several studies showed that resistance training resulted in an increase in electromyographic activation, possibly explained by improved motor unit recruitment, increased firing rate, and better synchronization.21 In this patient strengthening focus on major muscle group : upper body muscles (deltoid, trapezius, biceps, triceps, latissimus dorsi, pectoralis), core muscles (rectus abdominalis, internal and eksternal oblique abdominalis), and lower body muscles (gluteal, hamstring, quadriceps, hamstring,, gastrocnemeus).

Balancing exercise using frenkel exercise and walking exercise. Frenkel is a type of aerobic exercise that corrects motor defects in the cerebellum, stimulate voluntary movement control, and helps the Central Nervous System (CNS) compensate the loss of the kinesthetic sense or the body sensory information (knowing where it is in space. It includes a series of slow, repetitious motions that are performed in different positions when lying down, sitting, and standing, and these programs target the cerebellum as the main center for controlling balance, and finally lead to an improvement in balance.26 In the course of a gradual worsening of Parkinson's disease, patients can receive benefit from periodic physical therapy. Walking exercises are important because it’s very helpful in preventing falls and trauma. Walking exercises generally train patients to take further steps and set foot on each step. Another method is to use visual cues to maintain the regular size of each step, for example by sticking some tape on the floor at regular intervals. In more progressive stages, silent episodes can occur, where the legs appear trapped on the floor. These silent episodes can be overcome by several techniques, such as imagining someone stepping past an imaginary line while counting on a regular rhythm, or by lining up regularly.7 Balancing measurement using Berg balance scale in this patient. In this case report balance measurement (Berg Balance Scale) was taken everytime patient come for control schedule and showed improvement after treatment.

Posture control exercises are given to get used to maintaining good posture. In Parkinson's disease, the posture of loss takes a more degrading position with a protracted shoulder, and the hips and knees bend. Postural reflexes generally have Parkinson's disease, which can lead to a tendency to fall backwards or sideways. Parkinson's can manifest itself in various ways that can cause disability. Patients with Parkinson's disease have a prevalence of obstructive and restrictive pulmonary disease. The loss of muscle flexibility coupled with the kyphos is posture felt by some people to contribute to respiratory problems. Posture training is done by asking the patient to feel movement, contraction and relaxation of the back muscles Stooping posture can cause difficulties in: deep breathing, swallowing, speaking clearly and loudly, walking and balance.17 In this patient found kyphotic posture with protacted on his both shoulder. Postural control exercise in the form of scapula retraction, axial extension, pelvic tilt, and thoracal & spinal control. After he applied the exercise regularly and made a good posture habit, there is an improvement of his posture which showed decrease of kyphotic posture and shoulder rounded.

Occupational therapy primarily helps in the

use of adaptive tools or helps create new routines, allowing Parkinson's patients to continue their activities independently.7 In patients found disruption of daily life activities (writing). The program provided is in the form of fine motor exercises (writing), hand exercises, ROM improvement exercises with skills, hand coordination exercise, balance training in the form of playing a ball game. In this patient found limitation of his activity daily such as writing, dressing, eating, toiletting, and bathing, and after he did routine exercise (hand coordination exercise, fine motor exercise, ADL with creativity and activity) he could do his activity daily living with decrease limitation.

The psychology of this patient was found . Patient feeling anxious about the disease. In psychology programs mental support is carried out for patients and his friends to reduce anxiety and encourage patients to always diligently attend a therapy program.

Medical social worker evaluation of the patient living with other fraters. Living in a frater dormitory, two floors, Lived in permanent house 2 floor, he lives in 2nd floor with other frater. Source of electricity is PLN, Source of water is PAM, use shower and sitting toilet. In his daily activity he walks through stairs to his room. He rejected to move 1st floor because he already comfortable at his room at this time due to nice view outside his room treatment costs using BPJS, recreational facilities do not exist. In the program carried out Motivation for patients to diligently attend therapy and motivate to him move rooms to the 1st floor to reduce the risk of falling while climbing stairs. He agreed to move his room in next month.

The benefits of rehabilitation therapy are more than just improving motor function. In terms of physical strength and muscle tone improvement as well as maintaining an adequate range of joint movements. While the psychological benefits obtained are that patients are actively involved in therapy and provide a feeling of being able to overcome the effects of the disease.7

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