

Case Report

Bilateral Lower Limb Paralysis Rehabilitation: A Case Study of Muscle Action Exercises Approach

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ABSTRACT

Background: Bilateral lower limb paralysis is a stressful medical symptom limiting activities of the nerves which controls leg muscles. Although, the option of exercise therapy in the treatment of bilateral lower limb paralysis has been recommended, its usage in Kumasi, Ghana, has not been well reported. This study therefore present a case report on the treatment of bilateral lower limb paralysis using muscle action exercise workout supported with literature review.

Case Description: A 74-year old woman was admitted to the clinical department of the Ejura Government hospital, Ejura, Ashanti with body temperature of 36.5°C, blood pressure of 110/65 mmHg and body weight of 98kg. The patient was diagnosed of Lumbago, Pruritic papular skin lesion, motor neuron lesion, unavailable dorsalis pedis on palpation and very faint on auscultation. She was placed on medical therapy with slight improvement and latter subjected to a 21-day muscle action exercise workout.

Results: Weight reduced to 72kg (26.5%) and full bilateral lower limb mobility has significant clinical restoration in the fifth week. *Dorsalis pedis*'s skill improved to 68 bpm regarded to be better than medical therapy only, body temperature upturned 37.4°C while blood pressure became normal at 120/65 mmHg.

Conclusion: Bilateral lower limb paralysis is a degenerative disorder that should be treated medically in conjunction with exercise therapy. Clinical rehabilitation centers are encouraged to take exercise inclusion in the promotion of holistic recovery, emotional stability and social re-integration of stroke patients obligatorily.

Keywords: Lower limb paralysis, Muscle action exercise, Rehabilitation

INTRODUCTION

Bilateral lower limb paralysis (BLLP) is a comprehensive loss of motor function in the muscle groups of both legs due to decline in neuromuscular mechanism.

⁽¹⁾ BLLP disturbs patient's ability to accomplish daily living activities that involve movement to and from. ⁽²⁾

Rehabilitation of BLLP often relies on lifetime pharmacological interventions ⁽³⁻⁵⁾ and exercise therapy technique that could

restore loss of function. ⁽⁶⁻⁸⁾ Both techniques are vital to stimulate nerve cells that run from the brain through the spinal cord out to motor pathways. Although drugs have been indicted to induce paralysis, ⁽⁹⁻¹²⁾ its huge financial burden is also far from the reach of average African. Exercise therapy is however less expensive and targets specific movement patterns that incite motor plasticity to patient so as to progress motor regaining and cause functional deficits to

reduce. (2) Distressed limbs need to be exercised since movement rehabilitation has strong relationship with the limbs. (13,14) Study has shown that muscle activation patterns are described using instrumented techniques that record biomechanical and electrophysiological signals during exercise. (15) Some instruments function only to activate muscular responses without recording. (16) Both regimental exercises are effective in increasing sensory motors by improving strength and dexterity in patients with BLLP.

Assessment

The patient was assessed upon arrival two days after the clinical assessment, treatment prescriptions and referral. Lower extremities function on leg raise of isometric contractions, bicycling on the floor and standing from the ground were assessed and she failed all. Vital signs reassessed with body temperature of 36.5°C, blood pressure of 110/65 mmHg, lack of *dorsalis pedis* (dorsal pedal pulse) on palpation, very faint on auscultation, lower limbs were numbed and insensitive to touch and other mechanical stressor. Muscles of the lower legs felt tender and loose on touch while that of the upper legs were not examined due to religious background (Muslim). The patient could not stand from sitting position, could not move the two legs but her arms were alive and mobile. She gave a recent history of a home-treated dislocation of the left ankle joint. The left lower extremity was not of major problem compared to the right. She speaks clearly, understandably and cooperatively.

Diagnosis

Exercise therapy was used for a 74-year old woman with BLLP referred for treatment by the clinical department of the Ejura Government hospital, Ejura, Ashanti with diagnoses of lumbago, pruritic papular skin lesion and motor neuron lesion. She was put on treatment of tablets that include multivitamin, Nucleocom, osteocare, Amoxyclav, supp diclofenac and vitamin B complex with slight improvement. The

patient was diagnosed of bilateral lower limb paralysis by clinical physician.

Management

The patient was purely treated with therapeutic massage and assisted exercises with the application of the principles of muscle actions (17,18) for four to five days per week, forty-five minutes on each of the days, 2 minutes rest periods in-between 3 workouts per week running 21 days.

First week

We started exercise therapy with assisted isometric contractions of leg raise, bicycling on the floor and standing from the ground for four days in a week. The target muscles were the muscles of the lower limbs (the soleus, hamstrings and quadriceps, calcaneus, gastrocnemius and the tibialis muscles) and the abdomen.

Second week

At the beginning of the second week, her body temperature has increased 36.8°C, blood pressure was 116/65 mmHg, *dorsalis pedis* stood at 16 bpm. She was taken through leg raise, bicycling on the floor, hip flexion and knees to the chest exercises for five days with rest in between every workout. Target muscles were the core muscle muscles of the lower extremities, gluteus and abdomen. Patient complained of body ache and was given paracetamol tablet (acetaminophen) being an asthmatic patient.

Third week

At the beginning of the third week, body temperature was 36.9°C, blood pressure became 118/68 mmHg while *dorsalis pedis* increased to 64 bpm. She passed leg raise, bicycle ride and hip flexion tests but failed to hyper-flex the hip joint. She was taken through leg raise, bicycling on the floor, fingers to the toe (static) and knees to the chest exercises for four days. Targeted muscles were the core muscles of the upper legs, gluteus abdomen and the back.

Fourth week

At the beginning of the fourth week, her body temperature has increased to 37.8°C with blood pressure of 120/70 mmHg

and *dosalis pedis* of 66bpm. She was able to raise leg, bicycling on the floor, hip flexion considerably and standing from the floor with aid. She could not stand from the ground unaided and from a stool of 27cm off the ground. She was taken through hip flexion, lying position hip hyper-flexion, fingers to the toe (bouncy, jerky), knee extension and torso rotation exercises lasted four days. Gluteus, trunk, the legs and the arms were the core muscles targeted.

Fifth week

The fifth week began with blood pressure of 120/80mmHg, body temperature of 37.5°C and pedal pulse of 68bpm but was unable to stand unsupported from the floor. The week aimed at seeing the patient get up from the floor unsupported and perform all motor activities as before (rehabilitation). She was then taken through torso rotation, trunk flexion, and lying position hip hyper-flexion for four days with attention on core muscles of the thighs, gluteus, and the trunk.

Table 1: Summary of Improvement Progress

Week of Treatment	Observation	Pre-value	Post-value
1	Body temperature	36.5°C	36.8 °C
	Blood Pressure (Systole/Diastole)	110/65mmHg	116/65mmHg
	Dosalis pedis/ Pedal pulse	-	16rpm
2	Body temperature	36.8°C	36.9 °C
	Blood Pressure (Systole/Diastole)	116/65mmHg	118/68mmHg
	Dosalis pedis/ Pedal pulse	16rpm	64rpm
3	Body temperature	36.9 °C	37.8°C
	Blood Pressure (Systole/Diastole)	118/68mmHg	120/70mmHg
	Dosalis pedis/ Pedal pulse	64rpm	66rpm
4	Body temperature	37.8°C	37.5°C
	Blood Pressure (Systole/Diastole)	120/70mmHg	120/80mmHg
	Dosalis pedis/ Pedal pulse	66rpm	68rpm
5	Body temperature	37.5°C	37.5 °C
	Blood Pressure (Systole/Diastole)	120/80mmHg	122/70mmHg
	Dosalis pedis/ Pedal pulse	68rpm	68rpm

Key: rpm = per minute revolution

RESULTS AND DISCUSSION

On the third day of the first week, the patient was able to lift only the left leg measuring 12cm between the floor and her heel. Her pedal pulse grew a bit stronger and she became slightly more sensitive without complaint. Her body temperature has increased to 36.8°C, blood pressure moved to 116/65mmHg while *dosalis pedis* stood at 16bpm. At the end of second week, there was increased strength and sensitivity as evidence by patient's response to touch, able to lift the affected limbs and perform other low intensity motor activities. Her body temperature raised to 36.9°C, blood pressure moved to 120/80mmHg with significant 66bpm increase in *dosalis pedis*.

The third week showed an increase in strength of the legs as well as sensitivity to touch and pains. She complained of general body pains attributed to exercise training workout and treated with paracetamol (acetaminophen) tablets. With consistency, she was able to stand from the ground wall-assisted and walk with a

walking stick. Body temperature surged to 37.8°C, blood pressure rise to 122/80mmHg while slim increase occurred to *dosalis pedis* (68bpm).

Week four witnessed an evidence increase in sensitivity and stronger limbs as the patient able to perform a number of motor actions including standing unsupported from height, standing from the floor while holding a 27cm tall stool and walk unaided. She complained less of general body pains and had body temperature of 37.5°C, blood pressure of 120/80 mmHg and *pedal pulse* of 66 bpm.

After the first day of training at the fifth week, the patient successfully stood from the floor unaided. She walked a distance of 10 meters to demonstrate that 'she had regained her form'. She progressed steadily for the rest of the week and trained for four days with easy. At the end, she reached body temperature of 37.5°C, blood pressure of 122/70mmHg and *dosalis pedis* of 68bpm considered to be better than medical therapy only.

Table 2: Group Statistical Difference

Variable	Weekly	Mean& SD	t	P-value	99% CI
Body Temperature	Pre	37.10±0.53	155.395	.000	36.00, 38.19
	Post	37.30±0.43	193.913		36.41, 38.18
Systolic Blood Pressure	Pre	116.80±4.14	62.974	.000	108.26, 125.33
	Post	119.20±2.28	116.885		114.50, 123.89
Diastolic Blood Pressure	Pre	69.20±6.61	23.407	.000	55.58, 82.81
	Post	70.60±5.63	27.995		58.98, 82.21
Dosalis Pedis	Pre	42.80±32.29	2.963	.041	-23.70, 109.30
	Post	56.40±22.64	5.569	.005	9.77, 103.02

Key: No of repetition/week = 5, df = 4, Significant at P <.01

Table 2 showed significance difference in the mean of the pre-post body temperature (P =.000), SBP (P =.000), DBP (P =.000) and dosalis pedis (P =.041/.005) weekly improvement of the patient. Results showed significant 26.5% reduction in weight (98>72 kg), body temperature, systolic and diastolic blood pressure, and dosalis pedis after 21 days.

CONCLUSION

Authors re-establish the benefits of exercises in rehabilitation processes based on this case study. We conclude that bilateral lower limb paralysis is a degenerative disorder that should be treated medically in conjunction with exercise therapy. Rehabilitation centers are encouraged see exercise inclusion in the promotion of holistic recovery, emotional stability and social re-integration of patients as obligatory.

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