Massage Therapy for Dystonia: a Case Report

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Background: Dystonia is a neurological disorder, characterized by involuntary muscle spasms and tremors, resulting in abnormal movements and posture. Symptoms include pain, spasms, tremors, and dyskinesia—a difficulty in performing voluntary muscular movements. Conventional treatments include medication, botulism injections, and surgical intervention. Many dystonia patients seek complementary and alternative medicine (CAM) therapies, such as massage, but these treatments are not well documented. This clinical case study documents massage treatment for dystonia for a specific individual.

Purpose: To examine the effects of massage therapy on pain, spasms, and dyskinesia in activities of daily living (ADL), in a patient diagnosed with dystonia as an adult, following trauma.

Methods: A student massage therapist administered 5 massage treatments over a six-week period to a 51-year-old female patient diagnosed with dystonia. The patient presented with symptoms of pain, spasms, tremors, and dyskinesia in ADL. Techniques applied included Swedish massage and hydrotherapy to decrease pain and spasms, and myofascial release and stretching, to decrease dyskinesia. Treatments aimed to increase overall relaxation. Remedial exercise was given to practice smoother movement patterns. Pre- and postnumeric rating scales (NRS) for pain were evaluated each session. Frequency of night pain and spasms, the Modified Bradykinesia Rating Scale (MBRS), the Timed Up and Go (TUG) test, the Functional Rating Index (FRI) and the Modified Gait Efficacy Scale (MGES) were measured at the start and end of the study.

Results: Posttreatment pain intensity generally remained the same or decreased. Positive outcomes were exhibited in the frequency of night pain and spasms, TUG, MBRS, and FRI test scores. The MGES score was negatively affected.

Conclusion: The results suggest massage therapy may temporarily decrease pain intensity, pain and spasm frequency, and dyskinesia in ADL, associated with dystonia.

KEY WORDS: neurologic disorders; movement disorders; dystonia; massage; pain

INTRODUCTION

Dystonia is a neurological condition, characterized by sustained involuntary muscle spasms, tremors, or excessive muscle activation, resulting in twisting, writhing movements and abnormal posture.[1-4] Dystonic patterns vary in severity, depending on the activity or posture, and may occur at rest.[1,2] Typically considered a movement disorder, growing evidence indicates abnormalities in sensory and perceptual functions, neuropsychiatric and cognitive issues, and sleep.[2,3] Reliable screening is currently unavailable for large populations, and dystonia is likely underdiagnosed or misdiagnosed.[5]

There are over 50 types of dystonia and associated syndromes, with new emerging classifications being established.[1,6] For example, primary dystonia is where dystonia is the only clinical sign.[1,3,6] Late-onset occurs after 30 years of age.[1,3] Focal dystonia affects single, or multiple, non-contiguous body regions.[1,3]

Current research regarding the etiology of dystonia is inconclusive.[1-3] Causes of dystonia may be multifactorial, and will vary widely, depending on the type.[1,3,5] Dystonia may be a result of brain trauma,[1-3] or peripheral trauma.[7]

The symptoms of dystonia may cause significant disability and impaired quality of life.[1] Decreased functional ability can be task-specific, or generalized to ADL.[1,8]

Typical symptoms include abnormal posture, pain, spasms, tremors, and dyskinesia, a difficulty in performing voluntary muscular movements.[1,4,9] Planning of voluntary movements may also be affected.[2] Commonly affected are the neck or eyes, but other areas may be affected, such as the trunk, limbs, and hands.[7]

There is currently no known cure for dystonia, and treatment is aimed at restoring function and managing symptoms.[3] Conventional treatments include prescription medication, botulism injection, and surgical intervention.[1,3,4] Physical therapy, rehabilitation, and ergonomic changes have also been used.[3,4,8]

Dystonia patients frequently use complementary and alternative medicine (CAM) to manage symptoms.[4] Fifty to eighty per cent of participants in various studies used massage, acupuncture, relaxation, homeopathy, chiropractic adjustments, and breathing therapy, often in conjunction with conventional therapies.[4,9-11] Previous research showed dystonia patients could benefit from CAM.[4]

The effects of massage on dystonia are not well documented; a literature review displayed a significant lack of research in peer-reviewed publications. One periodical article was found, relating the use of massage therapy on focal hand dystonia, with no specific interventions or results documented.[12] Some types, such as focal hand dystonia and cervical dystonia, have been more frequently studied;[8,11] however, treatment mainly involved physical therapy rather than massage.[8] In addition, as there are numerous types of dystonia that respond differently to various treatments, this information may not be applicable to other dystonia classifications.[3,5,9]

This report aims to bring additional insight into the symptom management of dystonia. Considering the high use of CAM with dystonia patients, it is important to discover effective therapeutic massage treatments for dystonia. The objective of this case study is to observe the effects of massage therapy on pain, spasms, and dyskinesia in ADL, in a patient with dystonia.

METHODS

Participant

A 51-year-old female acupuncture student presented to the clinic with an unspecified classification of dystonia. Symptoms began 19 years ago following a rock climbing accident, where she fell on her feet from a height of eight metres. She felt immediate pain in her lower body, sustaining numerous musculoskeletal injuries. X-rays of her feet showed multiple fractures; no other tests were sought at the time. She claimed neurological symptoms began after the accident, including pain in the thoracolumbar spine radiating to the upper and lower body, muscle spasms and tremors in the hands and feet, and difficulty walking. Treatment included physiotherapy, chiropractic manipulations, massage therapy, and exercise rehabilitation. The patient noted these modalities would often elicit pain and spasms during application. Pain, spasms, and jerky, unstable movements persisted, following recovery from the injuries. In 2003, her neurologist diagnosed dystonia. Baclofen, a medication commonly used for certain types of dystonia,[1] was prescribed in 2006 and ingested for 18 months. Over the past year, the patient managed her symptoms with weekly acupuncture treatments, and light exercise three times a week.

Past history included a head injury sustained in a motor vehicle accident in 1982, resulting in occasional tingling in the head or vision changes.

Her major complaint was pain and tension in the posterior thoracolumbar region, causing radiating pain in the shoulders, neck, hips, and thighs, and spasms in her hands and feet. The pain and spasms would cause occasional tremors in her hands and feet, affecting her ability to type, sit, stand, or walk for long periods. Her main goals for treatment were to decrease pain, spasms, and dyskinesia in ADL.

Clinical Findings

The numeric rating scales (NRS) was used to evaluate pain intensity, as previous research supported the validity of this scale.[13] On a scale of 0 to 10, the squeezing, radiating pain in the posterior thoracolumbar region was usually 3, at least 1, and at worst 7. Sitting, bending, lifting, climbing stairs, overexertion, and repetitive hand movements aggravated the pain. Rest, lying down, or time, eased the pain. Lower body pain was reportedly worse in the left hip but lessened when walking, and woke her up one to five times every night. Other symptoms included occasional headaches

in the posterior cranium and difficulty breathing during painful episodes.

A full lumbar scanning assessment was performed, including observation of posture and gait, as well as orthopaedic tests.[14] Postural analysis indicated slight hyperkyphosis with trunk rotation to the right. The right shoulder presented with elevation and medial rotation. An ataxic gait of uncoordinated, unsteady movement was noted, with slight hip drop and unstable, jerky movements of the lower body. When performing a squat, the patient required support with her hands on her thighs; there was exaggerated forward flexion of the torso at the end range, and movement was slow and jerky.

Assessment Measures

The quality of pretreatment assessment is essential, as it will affect outcomes and posttreatment comparison.[3] The Fahn–Marsden Rating Scale (FMRS), Unified Dystonia Rating Scale, and Global Dystonia Rating Scale are standards for evaluating dystonia.[1,15] Due to the highly involved, lengthy protocols and requirement of an expert observer for these assessment tools,[5] other methods were selected for this case study due to limitations of time and experience. Assessment measures were chosen based on the patient's symptoms and desired outcomes. Pre- and posttreatment pain scales were assessed using the NRS at each treatment session.[13] As spasms occurred in the same areas of pain, no separate measure was taken. The patient was asked to keep a daily record of overnight pain and spasm frequency over the six-week period. All following measures were evaluated once before the first treatment, and once after the fifth treatment. To evaluate dyskinesia affecting ADL, various measurements were considered. Due to its ease in administration and ability to assess gait issues, the Timed Up and Go (TUG) test was used.[16] The test protocols are outlined in Appendix A.[16] The TUG test has effectively evaluated balance and mobility in older age populations and patients with neuropathy.[16,17] Two disability questionnaires were administered. The Functional Rating Index (FRI) scores how pain and back problems have affected a patient's ability to manage ADL (see Appendix B).[14] As back pain was the patient's major complaint, relevant feedback could be obtained. As her condition affected walking ability and gait, the Modified Gait Efficacy Scale (MGES) was used to evaluate her self-efficacy to perform walking tasks (see Appendix C).[14] Analysis of gait has been proven useful in other dystonia research.[18,19] The Modified Bradykinesia Rating Scale (MBRS) is a reliable measure highly correlating with kinematic variables.[20] Although the scale was designed for assessing Parkinson's disease (PD), dystonia also affects kinematic function;[18,19] therefore, the MBRS was used in this case study (see Appendix D).[20] To simplify assessment measures, only pronation-supination of both hands was evaluated.

Therapeutic Intervention

A MacEwan University massage therapy student in the fifth of six semesters of a 2,200-hour diploma program conducted the study in 2017. The patient attended the student massage clinic in Edmonton, Alberta, for treatment.

As an exact dystonia classification was not diagnosed, treatment design was based on the patient's goals for treatment, symptoms, assessment, and health history. Dystonia often presents with similar clinical manifestations as PD.[1,6] Therapeutic treatments suggested for tremors and spasticity, were therefore deemed appropriate for treatment in this case.[21]

Contraindications

Aggressive techniques should be avoided to promote relaxation for the patient.[21] Very light pressure, or quickly applied techniques like stretching or movement therapy, may cause stimulatory effects or activate the stretch reflex.[21,22] Deep pressure may overstimulate the tissue and increase muscle tension and rigidity.[22] Therefore, techniques and strokes were applied in a slow, rhythmical, continuous manner to prevent eliciting spasm during treatment.[21]

Treatment Plan

Following the initial assessment, 5 treatments were administered on the same day and time each week. Each session began with a discussion to involve the patient in the treatment process, and informed consent was obtained. Acupuncture received during the study period could affect the accuracy of the results; the patient agreed to discontinue treatments during this period. Fifty min were allotted for each treatment.

Table 1 details the plan developed for the patient; the main focus was relaxation-based, with an intention to decrease pain and spasticity.[21,22,24]

During the first treatment, additional assessments were made; therefore, only 30 min of treatment was provided in prone. A predetermined plan was created to obtain reliable and consistent results; however, modifications were made for the final two sessions, to adjust for patient concerns. The patient complained that certain techniques increased pain and spasm between sessions. The number of techniques applied was subsequently decreased, focusing on Swedish techniques to promote relaxation. Hydrotherapy, stretching, movement therapy, and joint mobilization techniques were exempt; Table 2 details the techniques used each session.

Home-care was given to increase relaxation and facilitate functional ability through improved flexibility, range of motion (ROM), and balance.[21] The patient was instructed to practice diaphragmatic breathing at rest, daily, either in a seated

TABLE 1. Treatment Plan

Position	*Technique*	*Application*	*Outcome*
Prone	Rocking and Stroking 2 min	Gentle full body rocking over the sheet; stroking of spine and sacrum; static contact on occiput and sacrum	Induce relaxation[21,22]
	Hydrotherapy 15 min	Apply moist heat pack on posterior thoracolumbar area	Decrease pain and hypertonicity[23]
	Swedish 10 min	Longitudinal stroking, palmar kneading, picking up, and wringing on posterior hip, thigh, calf and foot; origin and insertion frictions and movement therapy (passive ROM) at hip and knee	Increase relaxation; decrease pain, spasticity and hypertonicity; increase mobility[21,22]
	Neuromuscular 4 min	Gentle trigger point release at origin or insertions of hamstring muscles	Decrease pain referral patterns[21]
	Passive Stretching 2 min	Static hold of quadriceps and calf stretches	Increase muscle length and decrease hypertonicity[24]
	Myofascial 2 min	Remove moist heat; skin rolling across back	Relax and soften tissues[22]
	Swedish 10 min	Longitudinal stroking, palmar kneading, picking up, and wringing on posterior thoracolumbar region; rib raking; muscle squeezing to upper back region; muscle approximation along erectors	Increase relaxation; decrease pain and hypertonicity[21,22]
Supine	Swedish 8 min	Longitudinal stroking, palmar kneading, picking up, and wringing on anterior hip, thigh and lower leg; passive ROM of hip	Increase relaxation; decrease pain and hypertonicity[21,22]
	Joint Mobilizations 3 min	Grade II hip joint distraction and oscillations	Decrease pain and spasm[24]
	Passive Stretching 1 min	Static hold of gluteal stretch; movement therapy of hip	Increase muscle length and ROM[24]
	MLD 5 min	Head, neck, and anterior upper chest	Increase general relaxation and prevent headaches[25]
	Myofascial 1 min	Suboccipital release	Relax and soften tissues[22]
	Rocking and Stroking 1 min	Gentle full body rocking and bilateral stroking	Induce general relaxation and encourage whole body integration[21]

TABLE 2. Techniques Applied

Week	*Position*	*Techniques*
1	Prone	Rocking and Stroking 2 min
		Hydrotherapy 15 min
		Swedish 10 min
		Neuromuscular 4 min
		Passive Stretching 2 min
		Myofascial 2 min
		Swedish 10 min
2&3	Prone	Rocking and Stroking 2 min
		Hydrotherapy 15 min
		Swedish 10 min
		Neuromuscular 4 min
		Passive Stretching 2 min
		Myofascial 2 min
		Swedish 10 min
	Supine	Swedish 8 min
		Joint Mobilizations 3 min
		Passive Stretching 1 min
		MLD 5 min
		Myofascial 1 min
		Rocking and Stroking 1 min
4&5	Prone	Rocking and Stroking 2 min
		Swedish 12 min
		Neuromuscular 4 min
		Myofascial 2 min
		Swedish 10 min
	Supine	Swedish 10 min
		MLD 5 min
		Myofascial 2 min
		Rocking and Stroking 2 min

or supine position, and to perform a trunk rotation exercise, three to five times per week (see Appendix E).[21]

RESULTS

Table 3 provides a summary of the results. Intensity of pain in the posterior thoracolumbar region generally remained the same or decreased, in pre- and posttreatment data collection. Pain intensity was not reportedly high for most pretreatment assessments; changes in the profile were slight. A marked decrease was reported in Week Four, as the patient stated a higher pretreatment value relative to other weeks. Comparing pretreatment results from the first to the last week, the pain scale did not decrease. Frequency of pain and spasm experienced overnight displayed a 57% decrease.

TABLE 3. Summary of Results

	Week 1	*Week 5*
Pre-treatment Pain Scale (0-10)	3	3
Overnight Pain Frequency (nights/week)	7	3
Timed Up and Go Test (sec)	8.68	7
Modified Bradykinesia Rating Scale (0-24)	9	4
Functional Rating Index (0-40)	18	14
Modified Gait Efficacy Scale (0-100)	10	19

No marked changes were noted in postural assessment, except both shoulders presented level. Ataxic gait was still present; however, smoother movement was observed in the lower body. When performing a squat, the patient still required hand support on her thighs, but movement was smoother and faster relative to the initial assessment.

Improved outcomes were displayed with the TUG test score. A 19% decrease in time to execute the task was shown. The MBRS test score displayed improved results. For both hands, scores for rhythm were improved. Speed was also improved for the left hand. A 20% decrease in the FRI test score displayed an improved result. Frequency of pain, and pain with standing, were the parameters most notably affected. A 10% decrease in the MGES score indicated a loss of confidence in walking activities at the end of the study period. The patient noted increased difficulty in walking up and down stairs without a railing. During the pretreatment discussions of the last three sessions, the patient reported increased tension and soreness in the lower legs and feet from changes in walking conditions caused by the weather (slippery ground due to ice and snow), as the study period progressed.

In addition, after the third treatment, the patient noticed increased pain, spasms, or tremors, on nights following treatments or workout sessions. Although the overall pain scale did not decrease during the study period, at the end of the fifth session, the patient stated she felt, "amazed massage could provide relaxation because in the past it often worsened the symptoms." The patient did not manage to provide full data regarding frequency of pain and spasm experienced overnight for the whole period, as requested. The patient was only compliant with prescribed home care exercises during the first two weeks of treatment. In addition, she occasionally applied acupuncture to herself to ease pain during the week.

DISCUSSION

The results of this study demonstrate some positive, short-term effects on symptoms of dystonia through the application of massage therapy. Posttreatment pain intensity, frequency of pain, spasms, and dyskinesia were improved during the study period, meeting the patient's goals for treatment. The patient's altered gait during changing weather conditions during the study period may have contributed to the negative result in the MGES. A faster time in the TUG test, improved score in the MBRS, as well as smoother execution during walking and squatting movements, showed a decrease in dyskinesia. Patients with dystonia could possibly benefit from massage treatment in a clinical setting.[8,11,12]

Results were consistent with other findings that massage can perhaps reduce dystonia symptoms,[12] but note this source is not peer-reviewed. There are currently no reports on dystonia affecting two or more body regions,[9] and cases of peripheral trauma preceding the onset of dystonia are relatively rare.[7] Dystonia occurring in the lower limb is also uncommon and less documented, presenting a challenge in finding research directly related to this case.[26]

The importance of this case report is that little research has been done observing the effects of massage therapy on dystonia affecting more than one body region, following peripheral trauma, or in the lower limb.[7,9,26] It demonstrates how massage therapy can be effective in a clinical setting.

There are several limitations of this case study. The classification of dystonia is quite complex.[1,3,6] Knowledge of the patient's exact type of dystonia would have been beneficial to this case study. Her condition could have been more accurately addressed with increased specificity of research, evaluation of progress, and treatment given.[3,5] Inclusion of more stringent methods of evaluation, such as the FMRS, would have increased the validity of results obtained. Furthermore, reliable and consistent feedback could not be obtained due to treatment plan modifications in the final two sessions. As multiple massage techniques were employed, in conjunction with hydrotherapy and remedial exercise, conclusions could not be drawn regarding specific effects of each technique. Moreover, a longer period of observation may have yielded more reliable results.

Massage therapy may be a useful tool in symptom management for patients with dystonia.[8,11,12] This case study demonstrates massage can have a positive effect on pain, spasms, and dyskinesia in ADL, in a patient with dystonia. As few studies have been conducted on this topic, this report intends to inspire more research on massage therapy and its effect on dystonia affecting more than one body region, following peripheral trauma, or in the lower limb.

Further research is recommended to determine how effective massage therapy may be dystonia, and to find efficient and safe treatments.[4,9-11] More general practitioners are suggesting CAM, and more patients are using these alternatives in conjunction with conventional therapies.[4,10,11] Recent research displays a connection between sensory modalities and the motor systems affected by dystonia, implicating a need to investigate tactile inputs such as massage and its effects with this disorder.[2] For future research initiatives, randomized controlled trials and larger sample sizes will provide more reliable results.[2,3,9,10] As there is such a broad spectrum of dystonia types, more forms of the disorder need to be studied in clinical trials. Longer evaluation periods, to observe long-term effects, will also be informative. Isolation of various massage techniques will compare the efficacy of each, and aid in determining appropriate massage techniques for neuromuscular conditions. In this manner, individually tailored treatment plans may be designed for patients with dystonia.[10]

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CONFLICT OF INTEREST NOTIFICATION

The author declares there are no conflicts of interest.

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APPENDICES

Appendix A. Timed Up and Go (TUG) test protolcols.

Directions

Patients wear their regular footwear. Begin with the patient sitting back in a standard armchair and identify a line, 3 metres away on the floor. On the word "go", begin timing. Stop timing after the patient has sat back down.

Instructions to the Patient

On the word "go", stand up from the chair, walk to the line on the floor at your normal pace, turn, walk back to the chair at your normal pace, and sit down again.

Appendix B. Functional Rating Index (FRI) questionnaire.

Functional Rating Index

For use with **Neck and/or Back Problems** only.

In order to properly assess your condition, we must understand how much your **neck and/or back problems** have affected your ability to manage everyday activities.
For each item below, **please circle the number which most closely describes your condition right now.**

1. Pain Intensity

0	1	2	3	4
No pain	Mild pain	Moderate pain	Severe pain	Worst possible pain

2. Sleeping

0	1	2	3	4
Perfect sleep	Mildly disturbed sleep	Moderately disturbed sleep	Greatly disturbed sleep	Totally disturbed sleep

3. Personal Care (washing, dressing, etc.)

0	1	2	3	4
No pain; no restrictions	Mild pain; no restrictions	Moderate pain; need to go slowly	Moderate pain; need some assistance	Severe pain; need 100% assistance

4. Travel (driving, etc.)

0	1	2	3	4
No pain on long trips	Mild pain on long trips	Moderate pain on long trips	Moderate pain on short trips	Severe pain on short trips

5. Work

0	1	2	3	4
Can do usual work plus unlimited extra work	Can do usual work; no extra work	Can do 50% of usual work	Can do 25% of usual work	Cannot work

6. Recreation

0	1	2	3	4
Can do all activities	Can do most activities	Can do some activities	Can do a few activities	Cannot do any activities

7. Frequency of pain

0	1	2	3	4
No pain	Occasional pain; 25% of the day	Intermittent pain; 50% of the day	Frequent pain; 75% of the day	Constant pain; 100% of the day

8. Lifting

0	1	2	3	4
No pain with heavy weight	Increased pain with heavy weight	Increased pain with moderate weight	Increased pain with light weight	Increased pain with any weight

9. Walking

0	1	2	3	4
No pain; any distance	Increased pain after 1 mile	Increased pain after 1/2 mile	Increased pain after 1/4 mile	Increased pain with all walking

10. Standing

0	1	2	3	4
No pain after several hours	Increased pain after several hours	Increased pain after 1 hour	Increased pain after 1/2 hour	Increased pain with any standing

Appendix C. Modified Gait Efficacy Scale (MGES) questionnaire.

1. How much confidence do you have that you would be able to safely walk on a level surface such as a hardwood floor?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

2. How much confidence do you have that you would be able to safely walk on grass?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

3. How much confidence do you have that you would be able to safely walk over an obstacle in your path?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

4. How much confidence do you have that you would be able to safely step down from a curb?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

5. How much confidence do you have that you would be able to safely step up onto a curb?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

6. How much confidence do you have that you would be able to safely walk up stairs if you are holding on to a railing?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

7. How much confidence do you have that you would be able to safely walk down stairs if you are holding on to a railing?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

8. How much confidence do you have that you would be able to safely walk up stairs if you are NOT holding on to a railing?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

9. How much confidence do you have that you would be able to safely walk down stairs if you are NOT holding on to a railing?

1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

10. How much confidence do you have that you would be able to safely walk a long distance such as ½ mile?

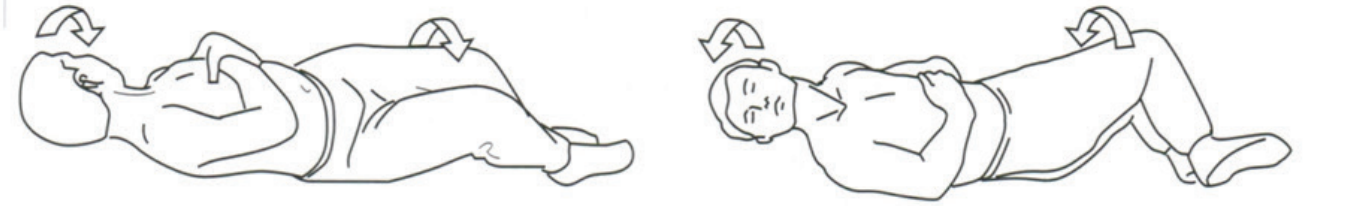
1	2	3	4	5	6	7	8	9	10

No Confidence — Complete Confidence

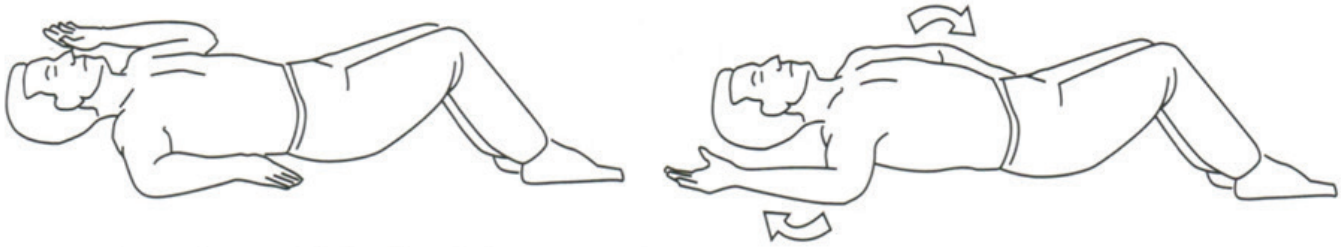
Appendix D. Modified Bradykinesia Rating Scale (MBRS).

Score	Speed	Amplitude	Rhythm
0	Normal	Normal	Regular, no arrests or pauses in ongoing movement
1	Mild slowing	Mild reduction in amplitude in later performance, most movements close to normal	Mild impairment, up to two brief arrests in the 10 seconds, none lasting > 1 second
2	Moderate slowing	Moderate, reduction in amplitude visible early in performance but continues to maintain 50% amplitude through most of the tasks	Moderate, 3 to 4 arrests in 10 seconds; OR 1or 2 lasting > 1second
3	Severe slowing	Severe, less than 50% amplitude through most of the task	Severe, 5 or more arrests/10 seconds; OR more than 2 lasting > 1 second
4	Can barely perform the task	Can barely perform the task	Can barely perform

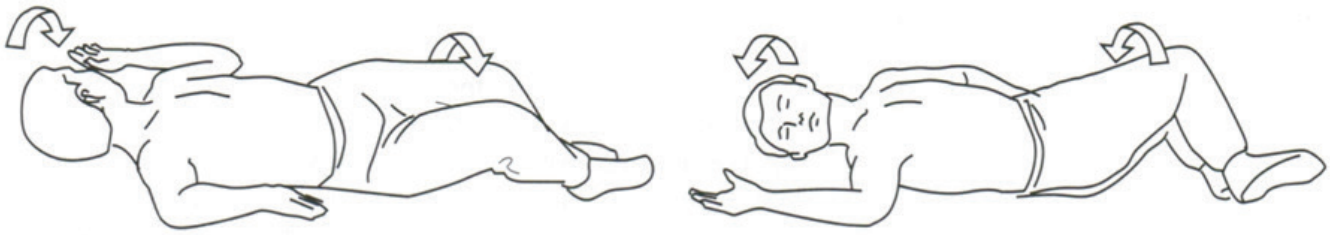
Appendix E. Trunk rotation exercise.



Part 1: The head rotates in one direction while the legs (with the knees flexed) rotate in the opposite direction.



Part 2: Ninety degrees of shoulder abduction, 90 degrees of elbow flexion. One shoulder internally rotates while the other externally rotates. These are performed alternately in a slow rhythmical manner. The legs are not involved.



Part 3: The above actions are combined in a smooth relaxed manner.

Figure 56.2
Trunk rotation exercises.