

Effects of physical therapy on mental function in patients with stroke

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Abstract

Objective: In this study, we aimed to determine the effects of physical therapy intervention on mental function in patients with stroke.

Methods: In this retrospective experimental study, we included 134 patients previously diagnosed with anxiety and depression who presented to our outdoor physical therapy clinic with hemiplegia owing to stroke during 2016 to 2018. The main interventions were neurodevelopmental techniques, strength training, stationary cycling, and shoulder wheel exercise. The treatment duration was 6 months, 5 days a week. Key outcome measurement tools included the Patient Health Questionnaire-9 (PHQ-9), Disability Rating Scale (DRS), and Functional Independent Measure (FIM). Baseline and post-interventional measurements were compared using a paired-sample *t*-test.

Results: Baseline scores on the PHQ-9, DRS, and FIM were 24.77 ± 1.24 , 19.67 ± 1.25 , and 20.77 ± 1.74 , respectively; post-intervention scores on these three scales were 9.08 ± 0.49 , 7.78 ± 1.49 , and 82.52 ± 10.03 respectively. In the comparison, significant differences were observed between baseline and post-interventional scores.

Conclusion: We found that physiotherapy interventions improved motor function in patients with stroke as well as their mental function. Patients with stroke with impaired mental function can improve by participating in a physiotherapy treatment program.

Keywords

Stroke, physical therapy, mental function, hemiplegia, depression, anxiety

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Introduction

Stroke, or cerebral vascular accident, is a neurovascular event that occurs when blood supply to the brain is impaired either owing to a blood clot in microvessels or rupture of a vessel in the brain.¹ Hypertension is the leading cause of cerebral stroke,² followed by dyslipidemia.³ The incidence of non-fatal stroke has been found to be associated with depression and alcohol use.⁴ Stroke is considered the leading cause of disability and death.⁵ Patients with stroke have a substantial level of mental health comorbidities, resulting in a high cost for mental health care after stroke.⁶ Patients with comorbidities face many challenges to improving their health status and quality of life,⁷ and this is particularly true for patients with stroke, hypertension, depression, and anxiety.⁸ The biopsychosocial model has been used to clarify that well-being is not only related to physical health but also to psychosocial health.⁹ Engaging in physical activity can improve the physical, psychological, and social health of normal individuals. People with depression, anxiety, substance abuse, and various mental disorders can receive many benefits from physical activity.¹⁰ However, there is limited research addressing whether patients with recent stroke who have a previous history of anxiety and depression can benefit from treatment with physical therapy. Therefore, we aimed to determine the effects of physical therapy intervention on mental function in patients with stroke.

Methods

This study was a single-center quasi-experimental study. The setting was an outdoor physical therapy and rehabilitation center. Patients who were previously diagnosed with anxiety and depression who presented with hemiplegia owing to stroke at

our clinic between 2016 and 2018 were included in this study. Sampling was purposive and the inclusion criteria were recent stroke and referral by a psychologist or psychiatrist with a history of anxiety, depression, or behavioral issues. In addition, patients of both sexes were included, aged between 37 and 60 years. Additional data, such as sociodemographic information, were extracted from the patient history and hospital records. Informed consent for treatment and details of the intervention were provided to the patient, a family member, or a caregiver prior to starting treatment. The appropriate institutional research board granted an ethical clearance certificate for this study.

After receiving initial medical treatment in the intensive care unit, patients were moved to the medical ward for 3 to 7 days. Patients were then discharged from the hospital and referred for regular physiotherapy services at our clinic. The main interventions provided were neurodevelopmental techniques, strength training, stationary cycling, and shoulder wheel exercises. The treatment duration was 6 months, and sessions were held 5 days per week. The outcome measurement tools used to assess patients' progress were the Patient Health Questionnaire-9 (PHQ-9),¹¹ Disability Rating Scale (DRS),¹² and Functional Independent Measure (FIM).¹³ The PHQ-9 is a new instrument used in criteria-based diagnoses of depressive and other mental disorders commonly encountered in primary care. The PHQ-9 is an outcome measurement tool, including nine modules. Each module is scored from 0 to 3. A score of 0 indicates minimum dysfunction in mental functioning and a score of 3 indicates maximum dysfunction; the maximum disability score for mental function is 27. The DRS is an outcome measurement tool used in patients with traumatic brain injury to evaluate cognitive ability in activities of daily living. The maximum

disability score on this scale is 29. The FIM is an 18-item tool to assess physical, psychological, and social function. The FIM is used to assess a patient's level of disability as well as change in patient status in response to rehabilitation or medical intervention. The PHQ-9, DRS, and FIM are all used in the evaluation of mental functioning; baseline and post-intervention measurements were made using these three scales.

Protocols

Table 1 provides a detailed description of the main interventions used in our physical therapy clinic among the included patients with stroke.

Statistical analysis

Mean score and standard deviation were used in descriptive statistics and a paired sample *t*-test was applied in to compare the mean scores. The significance level was set to 0.05. We used IBM SPSS version 20 (IBM Corp., Armonk, NY, USA) in the analyses.

Results

The final sample comprised 134 patients who fulfilled the inclusion criteria. The mean age of patients was 46.43 ± 6.56 years. Among the total, 86 (64.2%) patients were male and 48 (35.8%) were female. Thirty-seven (27.6%) patients had a lower socioeconomic (SES) level, 16 (11.9%) had lower-middle SES, 16 (11.9%) had middle SES, 37 (27.6%) had upper-middle SES, and 28 (20.9%) patients had a high SES level. Eighty-five (63.4%) patients had a family history of stroke. The most common cause of stroke was hypertension (82/134 patients, 61.2%). Baseline scores for the PHQ-9, DRS, and FIM were 24.77 ± 1.24 , 19.67 ± 1.25 , and 20.77 ± 1.74 , respectively; post-intervention scores were 9.08

± 0.49 , 7.78 ± 1.49 , and 82.52 ± 10.03 , respectively (Table 2).

Discussion

In this study, patients exhibited reduced disability, as assessed by improvement in their PHQ-9 and DRS scores, as well as greater independence according to increased FIM scores. In addition, patients showed satisfactory improvement in mental function. Patients were treated to improve their physical function only; however, with time patients, showed substantial improvement in their psychological and mental health. Exercise therapy has an important role in the management of patients with mental health disorders, but it is seldom used by health professionals in managing these patients. If patients with mental disorders are referred for exercise therapy in conjunction with traditional treatment, these patients can achieve greater benefits.¹⁴ In their recent article, Yung and Firth reported that physical activity is very effective in patients with mental problems and physical exercise should be considered in conjunction with other interventions.¹⁵ One study evaluated the effects of two physiotherapy interventions on cognitive function in patients with stroke and found that patients showed significant improvement in cognition as well as memory.¹⁶ Another study conducted by Tamawy and colleagues in 2105, in which they investigated the effects of aerobics training exercise on mental function in patients with stroke, revealed that aerobics training improved cognitive function in patients with ischemic stroke.¹⁷ A study examining the effectiveness of cognitive rehabilitation in patients with attention deficit after stroke used functional independence as an outcome measure, similar to the present work. That previous study concluded that cognitive rehabilitation has substantial effects on

Table 1. Physical therapy interventions in patients with stroke.

No.	Intervention	Description	Intensity	Volume	Frequency	Duration
1	Neurodevelopmental techniques	Neurodevelopmental techniques similar to Bobath approaches, with the following principles: 1. Handling techniques 2. Weight-bearing on affected limbs 3. Tone-influencing patterns 4. Inhibition and facilitation	Start with minimum challenge and build to maximum challenge	5 repetitions per session	5 sessions/week	6 months
2	Strength training	Strength training using functional activities, Therabands, weight belts, and manual resistance	Start with minimum resistance and build to maximum safe resistance	10 to 15 repetitions per session, according to the needs of the patient	5 sessions/week	6 months
3	Stationary cycling		Start with minimum resistance and build to maximum safe resistance	5 to 10 minutes	2 sessions/week	6 months
4	Shoulder wheel exercise		Start with minimum resistance and build to maximum safe resistance	5 to 10 minutes	2 sessions/week	6 months

Table 2 Scores for baseline and post-intervention measurements.

Scale	Baseline Mean \pm SD	Post-intervention Mean \pm SD	Paired-sample t-test <i>P</i>
Patient Health Questionnaire-9	24.77 \pm 1.24	9.08 \pm 0.49	0.00
Disability Rating Scale	19.67 \pm 1.25	7.78 \pm 1.49	0.00
Functional Independent Measure	20.77 \pm 1.74	82.52 \pm 10.03	0.00

SD, standard deviation.

functional independence in patients with stroke.¹⁸ In a systematic review, Cumming and colleagues concluded that increased physical activity after stroke enhances cognitive performance in these patients.¹⁹

Conclusion

In this study, we found that physiotherapy interventions improved motor and mental functions in patients with stroke who had a history of depression and anxiety. Participation in a physiotherapy treatment program would therefore be beneficial for such patients.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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