

Functional Recovery and Cognitive Improvement in Poststroke Rehabilitation through Integrated Yoga and Naturopathy Intervention

Abstract

Despite advancements in acute medical management, poststroke rehabilitation (PsR) remains a critical aspect in maximizing recovery and quality of life (QOL) for stroke survivors. In the present case report, poststroke survivor was administered a 90-day tailored integrated yoga and naturopathy (IYN) intervention including daily neutral arm bath, partial massage, and yoga therapy. Following interventions, clinically significant improvement in the range of motion of joints, handgrip strength (Lt. 2.7 kg vs. 14.9 kg), improvement in mid-arm circumference, gait, and cognition (Montreal Cognitive Assessment scores 16 vs. 29) was achieved. In QOL, there was an improvement in each domain of the Short Form 36 questionnaire except for role limitations due to the physical health domain. Improvement in blood pressure (150/60 mmHg vs. 118/70 mmHg) led to a reduction in need of medication. Notably, there was improvement in depression (19 vs. 08), anxiety (18 vs. 08), and stress (21 vs. 07) scores. This case report underscores the potential of IYN intervention in PsR.

Keywords: Cognitive improvement, functional recovery, integrated yoga, Montreal Cognitive Assessment, naturopathy, stroke

Introduction

Stroke is a leading cause of mortality and long-term disability worldwide, imposing a significant burden on health-care systems and individuals.^[1] As per a recent prevalence study, the incidence rate of ischemic stroke is projected to increase across all age groups and all sociodemographics.^[2] Stroke is a significant health concern, and poststroke cognitive impairment affects approximately 53.4% of survivors, it has an impact on various cognitive domains including attention, memory, function, and language. This affects quality of life (QOL) and leads to increased health-care cost. Various cognitive rehabilitation interventions such as occupational therapy and vocational training to improve overall well-being and provide support in returning to work poststroke have been tested for stroke survivors. After a stroke, rehabilitation plays a crucial role in helping patients regain function and independence. However, there are limitations in poststroke care that impact patient outcomes which include scarce rehabilitation services beyond tertiary centers, especially in low- and

middle-income countries.^[3] Functional limitations faced by stroke survivors include impairments in basic activities of daily living, with approximately 35%–40% experiencing these limitations 6 months after their stroke.^[4] Due to the lack of a holistic approach to manage the condition, their care remains suboptimal.^[5] While conventional therapies are crucial, there is a growing interest in integrative and evidence-based approaches such as yoga and naturopathy. Yoga, a traditional heritage, rooted in ancient India, combines physical postures (asanas), breath control (pranayama), and mindfulness practices. Its benefits are addressed to promote holistic health — address physical ailments, mental balance, and harmony. From the Vedas to contemporary studios, this timeless tradition continues to empower individuals on their healing journey. Yoga, a mind–body practice, equipped with posture, breath awareness, and meditation, has gained attention for its potential benefits in poststroke rehabilitation (PsR) improving physical functioning and mental well-being among stroke survivors.^[6] The holistic

**Shweta Mishra,
Sriloy Mohanty,
Ragini Shrivastava¹,
Monika Pathania²**

Departments of AYUSH
and ²Geriatric Medicine,
AIIMS, Rishikesh,
Uttarakhand, ¹Department of
Physiology, AIIMS, Bhopal,
Madhya Pradesh, India

Address for correspondence:

Dr. Sriloy Mohanty,
All India Institute of
Medical Sciences, Rishikesh,
Uttarakhand, India.
E-mail: sriloy.smo.ayush@aiimsrishikesh.edu.in

Access this article online

Website: <https://journals.iwwo.com/IJOY>

DOI: 10.4103/ijoy.ijoy_112_24

Quick Response Code:



This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Mishra S, Mohanty S, Shrivastava R, Pathania M. Functional recovery and cognitive improvement in poststroke rehabilitation through integrated yoga and naturopathy intervention. *Int J Yoga* 2024;17:246-50.

Submitted: 01-Jun-2024

Revised: 11-Aug-2024

Accepted: 13-Aug-2024

Published: 14-Dec-2024

nature of yoga, which promotes body–mind connection, contributes to its effectiveness in addressing brain health and thus helpful in the multifaceted challenges of stroke recovery. Naturopathy, emphasizing natural remedies and lifestyle modifications, offers a complementary approach to conventional stroke rehabilitation. The research underscores the significance and efficacy of naturopathy as an evidence-based medicine in health care. With its focus on lifestyle changes and noninvasive therapies, such as manipulative therapy and hydrotherapy, it provides a comprehensive and economical option for managing lifestyle-related disorders and improving overall health.^[7] Hydrotherapy involves the use of water for therapeutic purpose.^[8] Manipulative therapy is effective for improving muscle relaxation and motor function and for reducing spasticity in stroke survivors.^[9] However, scarce evidence is found in the literature, especially providing naturopathy treatments. This case report investigates the role of integrated yoga and naturopathy (IYN), including hydrotherapy and massage therapy, in PsR. The manuscript is written in accordance with CARE guidelines.

While the novelty of this case report lies in its integrated approach, it aligns with existing evidence that suggests yoga can positively impact balance, independence, endurance, and QOL in poststroke populations.

Case Report

Presenting concerns

A 59-year-old male patient registered at the AYUSH-Yoga and Naturopathy outpatient department (OPD) on December 1, 2023, with a medical history of ischemic stroke on October 12, 2023 and history of a road traffic accident in August 2016, resulting in loss of right eye and fracture in the left hand and leg treated with orthopedic implant. He presented with a complaint of left hemiparesis and a hemiplegic gait and needed support to walk to the OPD. He had pain in his left shoulder, wasting of muscles of his left upper and lower limb, difficulty in lifting his left arm, and struggling with routine activities including dressing himself and button his shirt. He had complaints of dizziness, loss of balance and coordination with lack of confidence, and fear of fall and injury. The sensations were intact. He also complained of speech difficulties and taking time to form sentences with impaired memory and difficulty recollecting recent past. There was no noticeable facial drooping or muscle weakness affecting the eyes, lips, or mouth. Noncontrast computed tomography brain (November 10, 2023) revealed ill-defined hypodensity at the right ganglion suggestive of an acute infarct. Currently, he was prescribed angiotensin receptor blocker (ARB) 40 mg OD, combination of atorvastatin, clopidogrel, and aspirin – HS, Vitamin B-complex – OD.

The patient's weight and body mass index were recorded every week. Resting blood pressure and pulse rate were

measured during daily doctors' visits using a cardiac monitor. The range of motion (ROM) of joints was recorded by a goniometer, and handgrip strength was measured by a handgrip strength dynamometer. Muscle power of the upper and lower limbs was assessed using the Medical Research Council Scale. It grades muscle strength based on a scale from 0 to 5, corresponding to different levels of power. The Depression Anxiety Stress Scale (DASS), the Montreal Cognitive Assessment (MoCA), and Short Form Health Survey (SF-36) questionnaire for QOL were administered before the treatment and posttreatment, i.e., at 90th day. In anthropometry, the mid-arm circumference was recorded at baseline and at 3-month postintervention. Patient consent was taken. The baseline recordings are depicted in Table 1.

Methodology

Following a comprehensive case history and obtaining informed consent, the patient was assessed using the National Institute of Health (NIH) Stroke scale. Table 2 depicts the NIH scores. The intervention, planned by yoga and naturopathy physicians, consisted of 12-week daily neutral arm bath for 15–20 min with finger and wrist joint movement, partial massage to the arm and leg with mustard

Table 1: Pre- and postcomparison

Variables	Baseline	30 days	Postintervention (90 days)
BMI (kg/m ²)	22.1	22.9	23.8
Blood pressure (mmHg)	150/60	104/68	118/71
Pulse rate (beats/min)	75	73	89
Mid arm circumference (cm)			
Left arm	24	24.5	25
Right arm	26	26	26
Handgrip strength (kg)			
Left	2.4	7	12.9
Right	27.7	29.9	29.9
Power			
Upper limb			
Right	5/5	5/5	5/5
Left	1/5	2/5	3/5
Lower limb			
Right	5/5	5/5	5/5
Left	3/5	3/5	4/5

BMI: Body mass index

Table 2: National Institute of Health Stroke Scale scores

Assessment criteria	Baseline score	After 90 days
Level of consciousness	0	0
Visual field testing	1	1
Arm weakness test	3	1
Leg weakness test	1	0
Limb coordination test	1	1
Sensation test	0	0
Speech language test	0	0
Dysarthria	1	0

oil for the same duration followed by the tailored yoga therapy protocol 35 min. Vital signs and blood parameters were monitored daily before and after treatment. After a thorough evaluation, an IYN protocol was designed by the research team based on the patient's condition and prognosis of the disease. The naturopathy therapy included lifestyle modification advice, hydrotherapy-neutral arm bath, and manipulative therapy, with a focus on strengthening muscles and relaxation of body–mind complex. The therapies were modified based on the patient's daily response. An integrated yoga program was designed considering the involvement of the mind–body complex in stroke pathogenesis. This program included asana, pranayama, meditation, relaxation techniques, and yoga Vimarsh; the detailed yoga module is reported in Table 3.

Patient perspective

I suffered from an acute stroke on October 10, 2023. It was so sudden and unpredictable. One day, I found myself so crippled. Despite all the medication and following all the instructions at the physiotherapy center, I did not find much change and was feeling helpless. I realized this disease had changed my life and affected my living, my walking, my speech, and my memory every aspect was not normal. I was dependent on others for my small routine. I visited the AYUSH department and was advised of yoga and naturopathic interventions. As these interventions proceeded, I started getting relief within 10–15 days. Now, I could walk alone to the OPD for my treatments without any assistance. I started performing yoga regularly and the massage and the warm arm bath helped me regain strength. I felt more confident and de-stressed.

Results

The patient underwent a tailored IYN intervention for 12 weeks from December 2023 to February 2024. Figure 1 depicts the detailed study profile. There is improvement in handgrip strength, especially left (2.4 vs. 12.9 kg) which

was affected poststroke, it was measured by the handgrip strength dynamometer. The mid-arm circumference of the affected left arm showed notable change. ROM of the joints also improved significantly, Table 4 depicts the same. Blood pressure was reduced from 150/60 mmHg to 118/70 mmHg in baseline based on which the medication ARB was tapered from 40 to 20 mg by the treating physicians. QOL was assessed using SF-36, and all parameters except role physical health showed significant effect [Table 5]. To add on even the psychological variable, depression (19 vs. 08), anxiety (18 vs. 08), and stress (21 vs. 07) scores measured by the DASS-21 scale showed clinically significant improvement [Table 6]. In the cognitive domain, the MoCA was used and there was an improvement of 13 points (16 vs. 29) compared to preassessment.

Discussion

This case study presents a 59-year-old male patient with a history of acute stroke who underwent a 12-week intervention of yoga and naturopathy. As per our knowledge, no study in the literature which has reported the effect of IYN on PsR. Our intervention resulted in significant improvements in various health parameters, demonstrating the potential benefits of these holistic approaches to health and wellness. The patient's range of movement of joints, handgrip strength, and mid-arm circumference were among the parameters monitored throughout the intervention. Notably, all these parameters showed significant improvements postintervention. In addition, the patient's mental health, as assessed by the DASS, and cognitive function, as measured by the MoCA, also improved. The results of this case study align with the understanding of disease in yoga and naturopathy, which classifies stroke as a mixed cause of Adhija (stress-borne illness with internal factors) and Anadhija Vyadhi (disease due to external factors). According to Yogic understanding, stroke may be classified as a mixed cause of Adhija (stress-borne illness with internal factors) and Anadhija Vyadhi (disease due to external factors), also Avidya is one of the causes of

Table 3: Integrated yoga and naturopathy protocol

Name of the practice	Details	Duration (35 min)/frequency 6 days a week for 12 weeks (min)
Sukshnavyayama	Neck, trunk, hand, leg	5
Yogic breathing exercises	Hand in and out breathing, hand stretch breathing, Tadasana breathing (with wall support)	5
Supine asana	Uttanapadasana (raised leg pose), Markatsasana (monkey spinal twist), Setubandhasana (bridge pose)	10
Prone asana	Bhujangasana (cobra pose), Navasana (boat pose)	3
Pranayama	Dirghashwash Pranayama (deep breathing)	2
Meditation	OM kara naad (chanting of OM kara)	5
Relaxation	Shavasana relaxation	5
Name of the intervention (naturopathy)	Details	Duration and frequency
Neutral arm bath	92°F–95°F	15–20 min 6 days a week for 12 weeks
Partial massage to arms and legs	Mustard oil	30 min 6 days a week for 20 days

Table 4: Goniometry

Left arm	Baseline (°)	Post 90 days (°)
Shoulder flexion	45	140
Shoulder extension	36	60
Shoulder abduction	78	120
Shoulder adduction	36	100
Shoulder external rotation	40	80
Shoulder internal rotation	10	50
Elbow flexion	90	120
Forearm supination	40	50
Forearm pronation	70	80

Table 5: Short-Form Health Survey Score

	Baseline (%)	Postintervention (%)
Physical functioning	0	40
Role limitations due to physical health	0	0
Role limitations due to emotional problems	0	33.3
Energy/fatigue	15	55
Emotional well-being	28	64
Social functioning	25	62.5
Pain	32.5	65
General health	5	30
Health change	0	25

Table 6: Depression Anxiety Stress Scale score

	Preintervention	Postintervention
Depression	19 (moderate)	8 (normal)
Anxiety	18 (severe)	8 (mild)
Stress	21 (moderate)	7 (normal)

disease.^[10] In naturopathy, diseases are considered the result of accumulation of toxins in the system, or not following nature's laws and natural lifestyle. The concept of health and disease in naturopathy follows the principles of unity of disease and unity of cure, panchamahabhuta theory, and panchakosha theory.^[11] Soaking the affected part in warm water helps improve circulation and promotes relaxation.^[12] Massage (sensory stimulation) can enhance sensorimotor function^[13] after stroke.^[9] Massage reduces anxiety and physiological stress, positively impacting overall health and QOL. The blood pressure was also reduced, and medication was reduced to ARB 20 mg from 40 mg. This does not only reduce the risk of major adverse cardio-cerebrovascular events but also reduce the economic burden of the patient. This case study underscores the potential benefits of yoga and naturopathy in managing poststroke cases. The significant improvements in both physical and mental health parameters highlight the importance of holistic approaches to health and wellness. These findings suggest that incorporating yoga and naturopathy into patient care plans could enhance health outcomes. While the results of this case study are promising, it is important to note

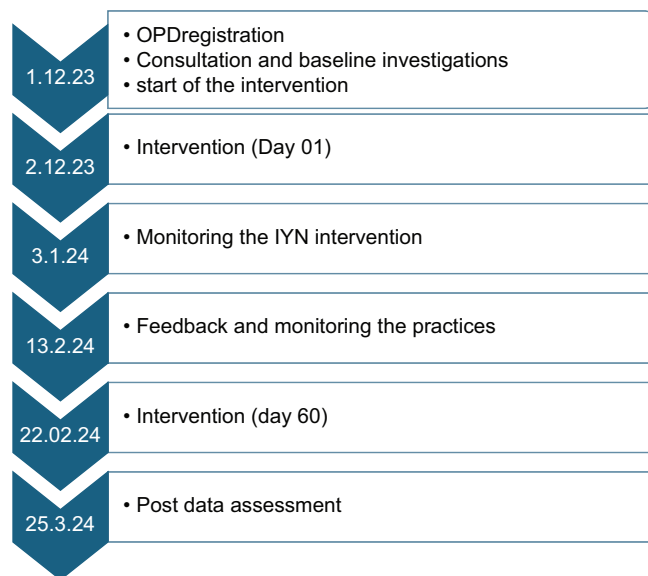


Figure 1: Detailed profile of the study. Neutral arm bath (32°C–36°C) – 10 min/day - 20 days. Partial massage to hand and leg - 20 days. OPD: Outpatient department, IYN: Integrated yoga and naturopathy

that these findings are based on a single case, and further research is needed to validate these results. Longer follow-up on a larger patient population could have been done to find more consistent effects. In future research, we should see nerve conduction which will give mechanistic and prominent beneficial effects of the administered interventions. Although we got positive feedback and result in this single case study, the result may not be generalized.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Acknowledgment

The authors would like to acknowledge the support of Medical Officers and staff of the Department of AYUSH, AIIMS, Rishikesh. We would also like to thank Mr. Sandeep Bhandari and Mr. Rahul Bijalwan for their support in providing therapy.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- Feigin VL, Owolabi MO, World Stroke Organization-Lancet Neurology Commission Stroke Collaboration Group. Pragmatic

- solutions to reduce the global burden of stroke: A World Stroke Organization-Lancet Neurology Commission. *Lancet Neurol* 2023;22:1160-206.
2. Pu L, Wang L, Zhang R, Zhao T, Jiang Y, Han L. Projected global trends in ischemic stroke incidence, deaths and disability-adjusted life years from 2020 to 2030. *Stroke* 2023;54:1330-9.
 3. Bernhardt J, Urimubenshi G, Gandhi DB, Eng JJ. Stroke rehabilitation in low-income and middle-income countries: A call to action. *Lancet* 2020;396:1452-62.
 4. Temehy B, Rosewilliam S, Alvey G, Soundy A. Exploring stroke patients' needs after discharge from rehabilitation centres: Meta-ethnography. *Behav Sci (Basel)* 2022;12:404.
 5. Management of Ischaemic Stroke Survivors in Primary Care Setting: The Road to Holistic Care | Internal and Emergency Medicine. Available from: <https://link.springer.com/article/10.1007/s11739-023-03445-y>. [Last accessed on 2024 Aug 04].
 6. Lai YT, Huang HL, Hsieh CC, Lin CH, Yang JC, Tsou HH, *et al.* The effects of yoga exercise on blood pressure and hand grip strength in chronic stroke patients: A pilot controlled study. *Int J Environ Res Public Health* 2023;20:1108.
 7. Dewangan S, Kumar BB. The relevance of naturopathy as a therapeutic tool in the modern era: A narrative review. *Altern Ther Health Med* 2024;30:38-41.
 8. Kesiktaş N, Paker N, Erdogan N, Gülsen G, Biçki D, Yılmaz H. The use of hydrotherapy for the management of spasticity. *Neurorehabil Neural Repair* 2004;18:268-73.
 9. Cabanas-Valdés R, Calvo-Sanz J, Serra-Llobet P, Alcoba-Kait J, González-Rueda V, Rodríguez-Rubio PR. The effectiveness of massage therapy for improving sequelae in post-stroke survivors. A systematic review and meta-analysis. *Int J Environ Res Public Health* 2021;18:4424.
 10. Varambally S, George S, Srinivasan TM. *The Science and Art of Yoga in Mental and Neurological Healthcare*. New Delhi: Jaypee Brothers Medical Publishers; 2021. p. 286.
 11. Fleming SA, Gutknecht NC. Naturopathy and the primary care practice. *Prim Care* 2010;37:119-36.
 12. An J, Lee I, Yi Y. The thermal effects of water immersion on health outcomes: An integrative review. *Int J Environ Res Public Health* 2019;16:1280.
 13. Rulleau T, Toussaint L. Massage can (re-)activate the lower limb sensorimotor representation of older adult inpatients. *Psychol Aging* 2018;33:832-40.