"Effect of Multi-Dimensional perceptual and cognitive training for visual and cognitive deficits in patients with acute ischemic stroke"

A Randomized Controlled Trial

Dissertation Submitted to the

Odisha University of Health Sciences, Bhubaneswar, Odisha

By

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In Partial fulfilment of the requirements for the degree of

MASTER OF PHYSIOTHERAPY (M.P.T)

In

NEUROLOGY

Under the guidance of

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Bhubaneswar, Odisha

2023-2025

Odisha University of Health Sciences

DECLARATION BY THE CANDIDATE

I hereby declare that this dissertation entitled **"Effect of Multi-Dimensional perceptual and cognitive training for visual and cognitive deficits in patients with acute ischemic stroke - A Randomized Controlled Trial**, is a bonafide and genuine research work carried out by me under the guidance of **Dr. Asma Parveen (PT), Senior Assistant Professor & HOD**, Abhinav Bindra Sports Medicine and Research Institute, Odisha**.**

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I dedicate this dissertation to my mother.

Date: Signature of the Candidate

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LIST OF ABBREVIATIONS

- ABSMARI- Abhinav Bindra Sports Medicine and Research Institute
- ADL- Activities of Daily Living
- BI- Barthel Index
- MoCA- Montreal Cognitive Assessment
- QoL- Quality of Life
- SD- Standard Deviation
- SF- 36- Short form 36 Health survey Questionnaire

ABSTRACT

Title

Effect of Multidimensional Perceptual and Cognitive Training for Visual and Perceptual Deficits in Patients with Acute Ischemic Stroke: A Randomised Controlled Trial

Background & Objectives

Visual and perceptual deficits following acute ischemic stroke significantly impact daily functioning and rehabilitation outcomes. While conventional therapies address basic functional impairments, the role of targeted perceptual-cognitive training remains underexplored and to evaluate the effectiveness of multidimensional perceptual and cognitive training on cognitive function, activities of daily living, and quality of life in patients with acute ischemic stroke.

Methods

A randomized controlled trial was conducted with 44 participants diagnosed with acute ischemic stroke and presenting with visual and perceptual deficits. Participants were randomly allocated into experimental (n=22) and control (n=22) groups. The experimental group received multidimensional perceptual and cognitive training in addition to conventional rehabilitation, while the control group received only conventional rehabilitation. The intervention lasted for 2 weeks, with assessments at baseline and post-intervention.

Outcome Measures

- Primary: Montreal Cognitive Assessment (MoCA)
- Secondary: Modified Barthel Index (MBI), SF-36 Health Survey

Results

The experimental group demonstrated significantly greater improvement than the control group in all outcome measure domains including MoCA (8.59 vs. 1.05), Barthel index (8.19 vs. 1.18) and quality of life (Physical: 8.45 vs. 1.14; mental: 8.54 vs. 0.87). The differences were statistically significant ($p < 0.05$).

Interpretation & Conclusion

This study showed significant improvements in cognitive, functional and quality of life measures for the intervention group compared to control. The result suggested that the intervention protocol positively influenced the stroke recovery outcomes. The result also supported the efficacy of the experimental protocol in enhancing the post stroke rehabilitation and patient well-being.

Keywords

Acute ischemic stroke; Cognitive training; Perceptual training; Functional recovery; Quality of life

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1. Introduction

Stroke is one of the most devastating neurological disorders, characterized by a sudden onset of focal neurological deficits resulting from disruption of cerebral blood flow. Globally, it continues to represent a major public health challenge, not only because of its high prevalence but also due to profound and long-lasting consequences it imposes on survivors, families and healthcare systems. According to the Global Burden of Disease (GBD) reports, stroke consistently ranks among the top three causes of death and is the leading cause of long term disability in adults (1). Unlike many acute medical conditions, stroke rarely resolves fully without sequela, leaving the majority of survivors with varying degrees of impairment.

The epidemiological profile of stroke varies across the globe. High-income countries have shown a relative decline in stroke incidence, largely owing to effective preventive strategies and specialized stroke care units. In contrast, low and middle income nations, including India, face rising numbers due to lifestyle changes (2), urbanisation and poor control of risk factors such as hypertension, diabetes and obesity. An emerging concern is the growing incidence of stroke among younger adults, particularly ischemic stroke, which carries profound social and economic consequences by affecting people in their most productive years (3).

From a pathophysiological perspective, stroke is classified into ischemic and hemorrhagic types. Ischemic stroke accounts for nearly four out of five cases, generally arises from thrombotic or embolic inhibition of cerebral vessels, performing in unrecoverable infarction in the affected core and potentially salvageable towel in the penumbra (4). Hemorrhagic stroke although less

common, are often associated with higher early mortality because of bleeding and increased intracranial pressure.

The consequences of stroke extend beyond motor weakness or paralysis. Cognitive impairments, communication deficits, mood disturbances and compromised quality of life are frequently reported (5). Cognitive dysfunction is especially significant, as up to two-thirds of survivors show impairments in memory, attention or executive functioning during the first year post-stroke. These challenges can restrict daily independence, interfere with rehabilitation and hinder social reintegration.

From a broader perspective, stroke imposes a layered burden. For the individual, it disrupts autonomy and self-identity; for families, it creates emotional, financial and caregiving challenges; and for society, it contributes substantially to healthcare expenditure and productivity loss (6). In countries, like India, the economic impact is magnified because of limited rehabilitation resources and high out of pocket costs for long term care.

Stroke is not merely a medical emergency but the onset of a long term condition that disrupts multiple facets of life. Survivors frequently face a wide spectrum of challenges beyond motor weakness, including cognitive dysfunction, speech and language deficits, emotional disturbances and reduced quality of life (6). These various outcomes necessarily need rehabilitation that goes beyond just physical restoration alone.

Cognitive impairment is one of the most under recognised yet disabling consequences of stroke. Studies which were reviewed during the course of this

research process suggested that 50-70% of stroke survivors experience deficits in domains like memory, executive functioning, visuospatial ability and attention within the first year of stroke (7). These impairments significantly affect daily living activities and independency level and marks prediction for long term disability (8).

The Montreal Cognitive Assessment (MoCA) scale is widely used and accepted tool for screening post-stroke cognitive deficits. Unlike the Mini-Mental State Examination, MoCA is more sensitive to detecting mild impairments, particularly in executive and visuospatial domains (9). Early scores on the MoCA often show a close association with Barthel Index Ratings is suggestive of a person's cognitive status and how it is connected to the level of independency a person can manage their daily activities. In other words, when cognition is compromised, functional recovery is also likely to be limited. Although research has consistently demonstrated that targeted cognitive rehabilitation can stimulate neuroplasticity and enhance the overall outcome, but the reality is very farfetched, motor recovery carries more emphasis while cognitive training is given relatively little attention.

So, recognizing the cognitive deficits early and integrating a structured intervention protocol is crucial. This way not only it will aid in functional recovery but also enhance the likelihood of successful inclusion into community and occupational roles.

Being able to achieve functional independence is one of the most important goals in stroke rehabilitation. The Barthel Index, is one of the most trusted measures for evaluating a patient's ability to carry out activities of daily living,

such as eating, personal hygiene, bathing, mobility and bladder or bowel control. The enduring value of this scale comes from its ease of use, sensitivity in detecting even small changes during recovery and its consistently strong reliability with test- retest and inter- rater agreement reported as high as 0.89-0.95 (12). These attributes have firmly established it as a reliable measure in both research and clinical practice.

Although it was initially designed for bedside clinical evaluation, the Barthel index has gradually become a central outcome measure in rehabilitation research and is frequently cited in clinical guidelines. It not only reflects how well therapeutic interventions improve independence in day to day life but also captures outcomes that matter most to patients and caregivers. Interestingly, its utility extends beyond functional assessment alone. Studies have shown significant correlations between Barthel scores, cognitive performance and health related quality of life (13), reinforcing its role as a tool that bridges motor recovery with broader domains of rehabilitation, including cognitive and psychosocial well-being.

Quality of life (QoL) has become an indispensable measure in stroke rehabilitation research, to reflect how survivors perceive their overall health, well-being and ability to participate in life roles. Instruments such as the Short-Form 36 (SF-36) offer a multidimensional perspective, assessing physical functioning, mental health, pain, vitality and social participation (14).

Improvements in quality of life do not always parallel improvements in motor or functional outcomes. Use of Barthel index and FIM scale marks the importance that rehabilitation must not be judges solely on physical recovery,

but on its capacity to restore a sense of well-being, autonomy and life-satisfaction.

Tele-rehabilitation and technology assisted interventions have clearly shown comparable improvements in cognition and function, which suggests that innovative modalities can complement traditional therapy and expand access to care (18).

By measuring QoL, rehabilitation outcomes can be better aligned with patient-centered care making it sure that interventions are meaningful and impactful in real life.

There are various clinical trials which underscore the value of combining cognitive, functional and quality of life measures to capture the multidimensional benefits of rehabilitation. For reference, studies have implemented continuous care or included in the protocol of their specific rehabilitation programs have reported greater improvements in MoCA, Barthel Index and SF-36 scores in experimental groups compared to controls (16, 17). These findings reinforce the importance of designing interventions that address multiple domains simultaneously.

Research Gap

The standard stroke rehabilitation mainly focuses on motor recovery which means that the cognitive and psychosocial issues like memory problems, reduced attention and trouble with daily problem solving doesn’t get attention (14). The rehabilitation facilities don’t use cognitive training at all or apply it inconsistently where in missing an important piece of recovery.

The outcome measures that are often used in stroke rehabilitation are mostly health related quality of life or for basic physical abilities (15). They fail to capture the greater impact of the stroke's impact on cognition and emotional deficits.

This gap is more observed in places with limited resources where cost, feasibility and the delivery of multidimensional care isn't fully possible (16). That is why there is a clear need for intervention protocols that not just improve the movement but also support the cognitive and emotional recovery. When these areas are well-checked, then the stroke survivors regain better independence and well-being (16, 17).

This study aimed to find a more comprehensive approach such that perceptual and cognitive training are weaved together within a structured protocol which would help in gaining improved effects on cognition, daily independence and overall quality of life (18). By focusing on these ignored areas this study aims to support a balanced model for stroke recovery.

NEED OF THE STUDY

This study addresses the gap by simultaneously evaluating cognitive recovery, functional independence and quality of life in stroke patients undergoing experimental and conventional interventions. By integrating these outcomes, the study not only quantifies recovery but also examines the reality index from a patient's perspective.

The current rehabilitation practice primarily targets motor outcomes, while the cognitive and psychosocial training is missed at standard protocols. As in many clinical contexts with restricted time and infrastructure, rehabilitation models should be cost- effective, feasible and holistic in nature.

There is limited awareness and understanding of perceptual disorders in stroke and thus there is need of such research. It is also possible that in those with severe stages in stroke, the perceptual impairments may be masked by other conditions which may prelude formal assessments and limit self- report.

This type of evidence is uniquely valuable for modifying the standard rehabilitation strategies in India where the stroke incidence is rising and healthcare resources are stretched.

This study projects that the experimental intervention might lead to better outcomes in cognition, daily functioning and quality of life which can support its implementation in future treatment protocol for stroke survivors.

2. Aim & Objectives

AIM OF THE STUDY

The aim of this study is to evaluate the effectiveness of the experimental intervention that is multidimensional perceptual and cognitive training in improving cognitive function, functional independence and health related quality of life among stroke patients compared with conventional rehabilitation approaches.

OBJECTIVES OF THE STUDY

- To measure the effect of the experimental intervention on cognitive performance using the Montreal Cognitive Assessment (MoCA), and compare it with standard rehabilitation.
- To determine the impact of the intervention on activities of daily living using the Barthel Index, highlighting improvements in self-care and mobility.
- To analyze changes in quality of life domains following the intervention using standardized QoL measures and compares them with the control group.
- To explore correlations between MoCA scores and Barthel Index outcomes, thereby understanding the interplay of cognitive and functional recovery.
- To evaluate the practicality, acceptability and sustainability of implementing the experimental intervention in a rehabilitation setting.
- To be able to provide clinical evidence which supports the integration of cognitive, functional and QoL outcomes into rehabilitation protocols, strengthening the adoption of holistic interventions in stroke recovery.

3. **Hypothesis**

- **ALTERNATE HYPOTHESIS**

There is significant impact of a multi-dimensional perceptual and cognitive training for visual and cognitive deficits in patients with acute ischemic stroke and improve the overall quality of life.

- **NULL HYPOTHESIS**

There is no significant impact of a multi-dimensional perceptual and cognitive training for visual and cognitive deficits in patients with acute ischemic stroke and improve the overall quality of life.

4. Review of Literature

1. **Zhu Y, Wang S, Li L, Chen H, Zhou J (2025)** Conducted a systematic review and meta-analysis addressing the dual task based training in stroke patients. The findings from this particular study demonstrated improvements in both motor and cognitive outcomes which clears out the growing evidence for better integrated rehabilitation approaches.
2. **Namgung E, Kim BJ, Kwon JH, et al. (2025), JAMA Network Open-** This article is based on a randomized clinical trial done for personalized visual perceptual learning and digital therapy for visual field defects. It is a multicenter RCT that tested a personalized visual perceptual learning (VPL) digital therapeutic versus no intervention in chronic post-stroke visual field defects. Training (VR/mobile headset, 12 weeks) produced significantly greater improvements in defective hemi field sensitivity and whole field measures versus control. It is observed that there is high adherence and clinically meaningful visual gains which suggest that perceptual learning can restore sensory function even months after stroke.
3. **Nys GM, Van Zandvoort MJ, Kappelle LJ et al. (2023)-** This study found that there is presence of cognitive disorders in acute stroke which shows a high prevalence of perceptual and cognitive deficits. This study reinstated the importance of addressing cognition early in rehabilitation protocol.
4. **Park M, Ha. Y. (2023)-** The article discusses about the effects of virtual reality based cognitive rehabilitation in stroke patients which is a randomized controlled trial. Three arm RCT which compares

immersive VR cognitive training, computer-assisted cognitive rehab and conventional rehabilitation (8 weeks). The VR group showed larger improvements in global cognition, visual perception, ADLs than comparing group. This study shows that immersive perceptual and cognitive tasks with self-efficacy strategies can prove better outcomes.

5. **Mulhern M. et. al (2023),** Cognitive rehabilitation interventions for post stroke populations. Delaware J Public Health.
6. **Wonho Choi et al. (2022),** The effect of task oriented training on upper limb function, visual perception and activities of daily living in acute stroke patients: A pilot study.
7. **Sun R, Li X, Zhu Z et al. (2022),** Frontiers in Neurology- effects of cognitive- motor dual task training in patients with post stroke cognitive impairment: randomized controlled trial. RCT of cognitive motor dual task (CMDT) training vs. single domain control in PSCI. CMDT produced greater MoCA scores and better neurophysiological markers referring to improved neural efficiency.
8. **Feigin VL, Stark BA, Johnson CO, Abady GG, et al. (2021)-** This article talked regarding the Global Burden of Disease analysis which reports stroke as a leading cause of death and disability worldwide.
9. **Nirmal Surya et al. (2020)**, Rehabilitation in Perceptual disorders in stroke patients.
10. **Cicerone KD, Langenbahn DM, Malec JF, et al. (2019),** Archives of Physical Medicine and Rehabilitation- this is evidence based cognitive rehabilitation systematic review (2009-2014). This review suggests structured restorative and compensatory approaches which results in

improving the cognitive domains and functional participation.

11. **Zietemann V, Georgakis MK, Dondaine T, et al (2018), Neurology**- this article suggests that early MoCA predicts long term cognitive and functional outcome and mortality after stroke.
12. **Laver KE, Lange B, George S, et al. (2017),** Virtual reality for stroke rehabilitation. Cochrane Database System Rev.
13. **Timmermans AAA, Seelen HAM, et al (2017).** Dual task and perceptual training systematic reviews.

5. Methodology & Procedure

This study was centered on a randomized controlled trial which involved the patients who are suffering from an acute ischemic stroke. The study was carried out at IMS SUM Hospital, Bhubaneswar with a sample size of 44 participants which was concluded using G power to make sure that it holds significant result.

The patients were screened given the various inclusion and exclusion criteria to mark sure that the patients are in acute onset phase i.e. within 48 hours as this window is recognized for increased level of neuroplasticity which in turn would make the rehabilitation efforts impactful.

The sampling was selected as purposive to make sure that intentionally the patients with acute ischemic stroke are selected based on the inclusion and exclusion criteria. The study duration was set at one year in which recruitment of patients was done with completion of 10 sessions over 2 weeks with appropriate outcome measures.

The intervention had two sides: one group which received multidimensional perceptual and cognitive sessions for two weeks which consisted of exercises for attention, perceptual reasoning and functional tasks. While the control group had conventional physical rehabilitation protocol. The sessions were prepared in such a way that there is a proper mix of perceptual and cognitive exercises not just motor recovery which made this study differ from the other standard practices for stroke rehabilitation.

SELECTION CRITERIA

Inclusion Criteria:

- Patients diagnosed as having ischemic stroke confirmed by CT or MRI
- First onset, within 48hrs of onset
- There should not be any contraindications in MRI examination, and the examination was completed with good image quality and complete clinical data
- Age= 40- 65 years old
- Gender: Both males and females
- GCS score= 9-14
- Medically stable

Exclusion Criteria:

- Participants with severe language problem.
- Neuropsychiatric problem interfering with cognitive assessment.
- Presence of additional severe medical conditions preventing active rehabilitation (e.g., cardiac failure, severe chronic lung disease necessitating a constant use of oxygen)
- Other causes of dementia rather than stroke
- Enrolment in another intervention trial.

OUTCOME MEASURE

Primary Outcome Measure

Montreal Cognitive Assessment Scale (MoCA)

In this study MoCA has been used as a primary outcome measure to evaluate cognitive function in all participants. It was selected due to its sensitivity to memory, attention and problem solving difficulties that are common after a stroke. I administered this test before and after the intervention protocol to track the changes in participant's cognitive abilities that could give more meaning to the multidimensional training protocol.

Secondary Outcome Measure

Barthel Index

This scale was used in order to reflect a person's ability to manage everyday activities such as mobility and self-care. This score at both baseline and follow-up were helpful in marking the improvement in independence giving an insight whether the cognitive benefits were marked into practical means or not.

SF-36 Questionnaire

The broader aspect of well-being was assessed using the SF-36 Quality of Life Questionnaire. This tool helped in marking recovery beyond physical means and to observe how the intervention affected psychological and social domains. This questionnaire allowed to measure changes in vitality, mental health, social participation and overall quality of life which helped to show

whether multidimensional cognitive training made a meaningful difference in the lives of stroke survivors.

Variables

- **Independent variable**

  Age

  Gender

  Stroke side affected

  Stroke territory

- **Dependent variable**

  MoCA scores

  Barthel scores

  SF 36 Physical and Mental scores

MATERIALS USED

1. Assessment Tools

- Montreal Cognitive Assessment (MoCA)
- Barthel Index (BI)
- SF-36 Health Survey Questionnaire
- Case record form

2. Intervention Materials

- Activity sheets
- Number cards

3. Pen

PROCEDURE

- The study was approved by the Institutional Ethical Committee (IEC) and the Institutional Research Review Committee. Samples of 44 participants diagnosed with acute ischemic stroke were taken. All patients were given a detailed explanation of the procedure in the respective groups and a written informed consent was obtained.
- Demographic data of the participants was collected and baseline assessment was performed.
- Then the subjects were randomly allocated into two groups:

  Group 1: Experimental group was given the multidimensional perceptual and cognitive training

  Group 2: Control group was given the standard stroke rehabilitation protocol

- Both the groups carried out the intervention program throughout the study. Intervention was given for 5 days a week for 2 weeks which counts up to 10 sessions.

Session Details: For Experimental Group (Approximately 45-60 Minutes)

1. Warm up (5 min): The session began with general orientation and mobilization
2. Perceptual training (15 min): Visual scanning 3 sets; visual-motor 2 sets
3. Cognitive training (15 min): Sustained attention
4. Functional training (10 min): gentle mobilization with simple calculations or renaming objects
5. Cool down (5 min): once this phase has come, the patient is asked to give their feedback and any occurrence of adverse effect is checked.

Procedure for Multidimensional Perceptual and Cognitive Training (Experimental Group)

- The participants allocated to the experimental group were detailed explained regarding the structured program of multidimensional perceptual and cognitive training.
- The intervention protocol included a graded series of tasks which targeted various key domains of cognition and perception.

Attention and Concentration: Activities such as cancellation tasks, digit span recall were administered to improve selective attention.

Memory Training: Recall of word lists, numbers and picture to object associations were employed to strike the working memory.

Visuospatial and Perceptual Training: Clock drawing and object recognition exercises were included to address the perceptual deficits.

Functional Tasks: The above tasks were administered along with functional activities like orientation to time & place, recognizing familiar objects.

The difficulty level of each task was specific and custom based ensuring participants adaptability and also to avoid fatigue and boredom.

Figure 1.1: Cognition Training

Figure 1.2: Perception Training

Session Details: For Control Group (Approximately 45-60 minutes)

1. Range of Motion and Strengthening- The patient was given gentle stretching, active-assisted and active strengthening exercises for the affected limbs.
2. Balance Training- Sit to stand, weight shifting activities were performed by the patient
3. Gait Training
4. Functional Activities- the patients were made to practice everyday tasks like grooming and dressing
5. Breathing and relaxation techniques were taught to the patients.

Procedure for Standard Stroke Rehabilitation (Control Group)

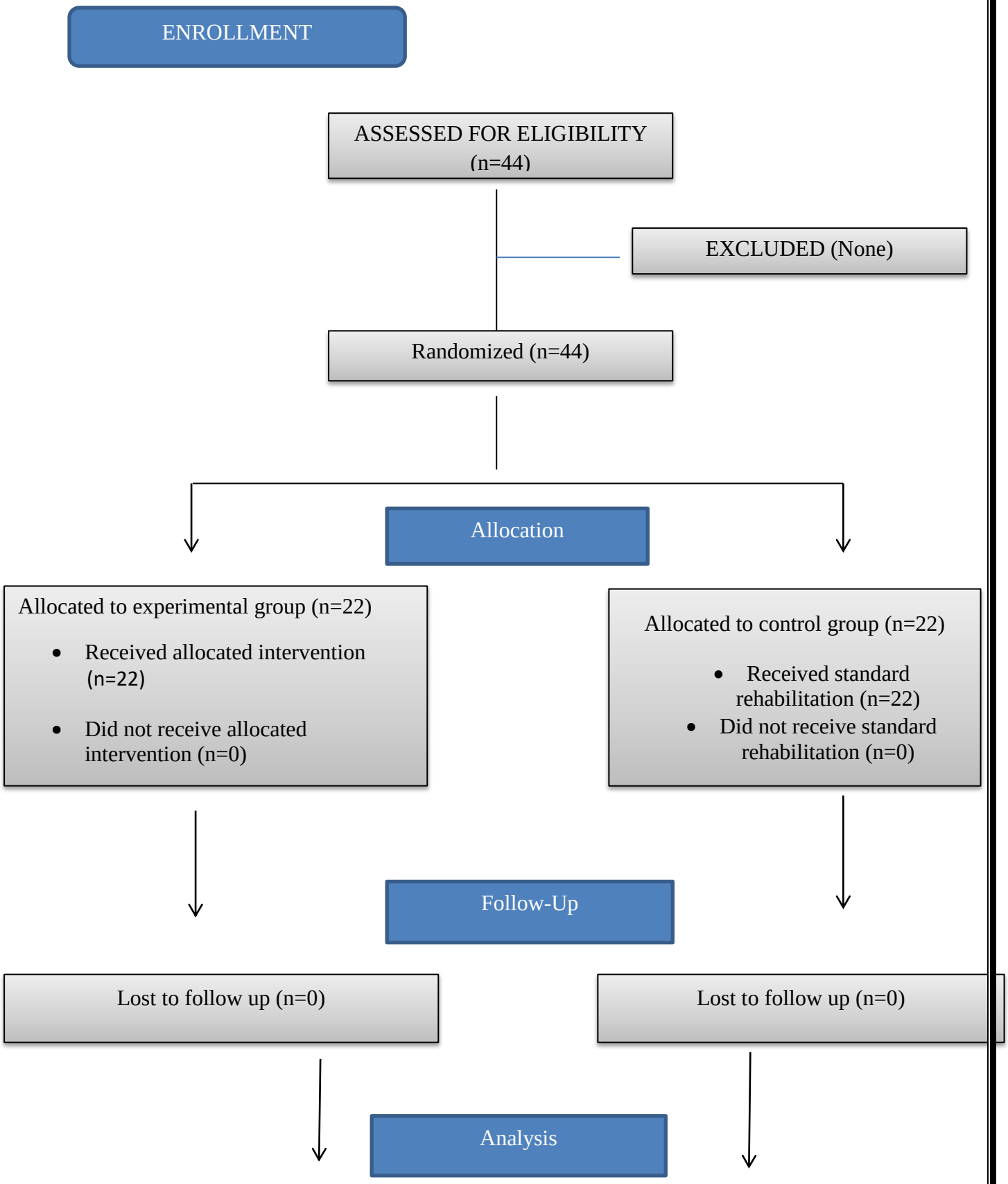
- The participants in the control group were provided with the conventional or standard stroke rehabilitation which consists of routine physiotherapy interventions that are usually delivered in a neurorehabilitation setting.
- This program enforced motor recovery and functional re- education without any cognitive or perceptual training.
- The protocol consisted of these exercises:

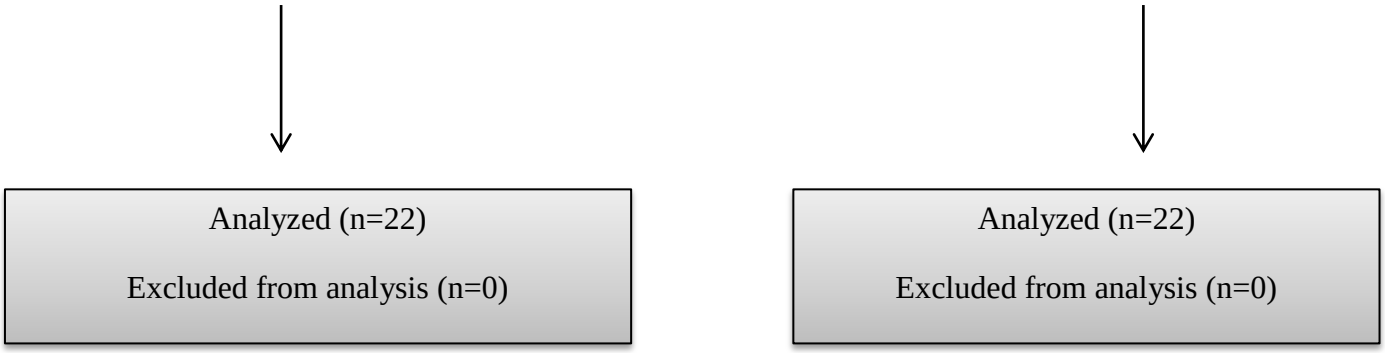
a. Range of motion and Strengthening exercises
b. Balance and postural training
c. Gait training
d. Activities of daily living practice

This program was followed with a progressive approach with the exercise intensity and task complexity adjusted to the participant functional level.

Figure 1.3: Standard rehabilitation protocol

CONSORT FLOW DIAGRAM




Analyzed (n=22)
Excluded from analysis (n=0)
Analyzed (n=22)
Excluded from analysis (n=0)

6. **Statistical Analysis**

The data was processed using the statistical package SPSS 27.0 with statistical significance established at $p<0.05$. Descriptive statistics including mean and standard deviation were calculated for each group to characterise the baseline and outcome measures. The normality of distributions across all primary variables was assessed using the Shapiro-Wilk Test. For the inferential analysis paired t-tests were utilized to evaluate within-group changes from pre to post intervention, while independent t-tests were applied to compare scores between the experimental and control groups.

7. **Result**

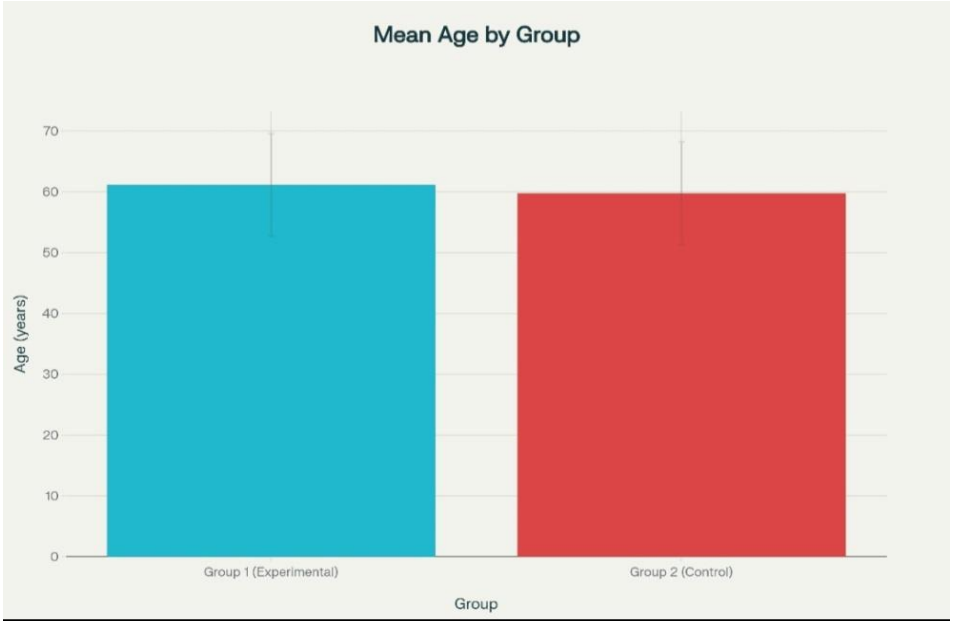
In the present study, 44 acute ischemic stroke patients were recruited. All the participants completed the study protocol and the data was analysed for 44 participants.

Demographic details of Group 1

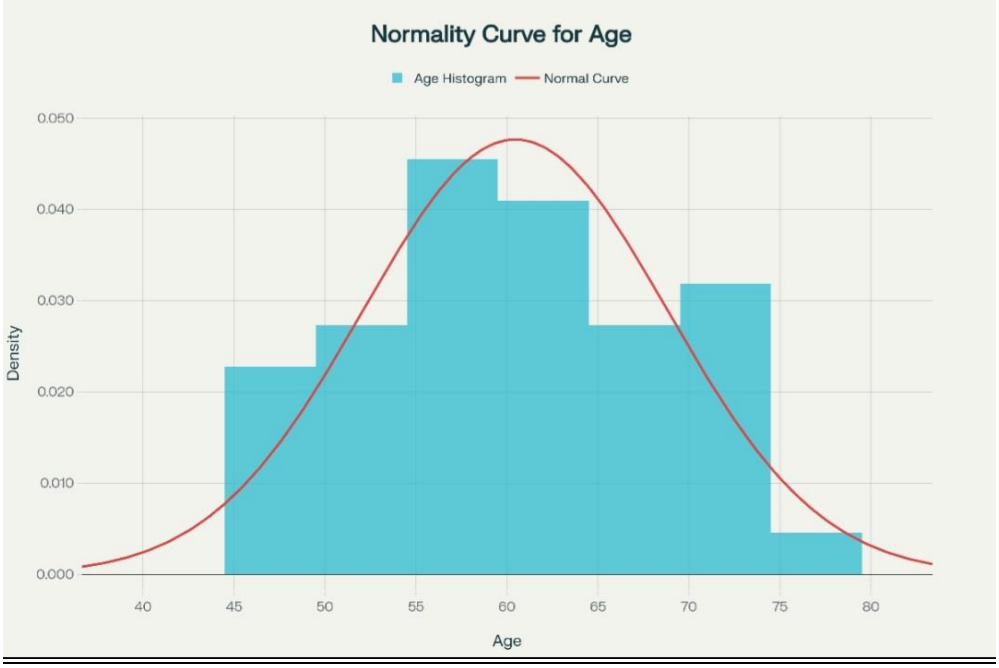
The experimental group consisted of participants with a mean age of 61.14, a median age of 62.5 years.

Table 1.1: Demographic details of Group 1 and Group 2

Variables	Group 1 (experimental) n= 22	Group 2 (control) n=22
Age (in years)	61.14 ± 8.42	59.77 ± 8.47
Gender (male, female)	14:8	17:5



Graph: 1.1: Graphical presentation of Demographic Details



Graph 1.2: Graphical representation for normality curve for age and bar chart for gender distribution

Demographic details of Group 2

The control group consisted of participants with a mean age of 59.77, with a median age of 61 years.

Comparison of Pre-intervention scores of Group 1 and Group 2

The comparison of pre intervention scores of MoCA scores between the experimental and control groups shows a slightly higher mean MoCA score (19.91, SD= 2.75) for the experimental group compared to the control group (19.18, SD= 3.32).

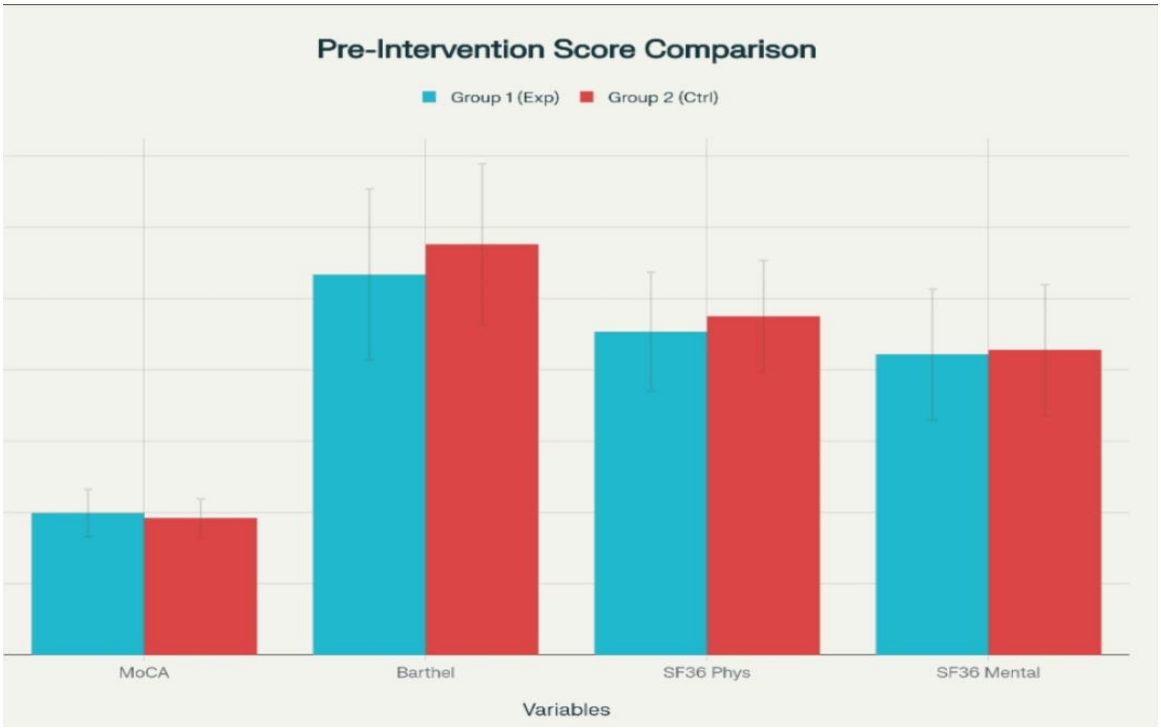
The baseline functional ability of the control group was greater than the experimental group. Control group has a higher mean Barthel Index score (57.59, SD=11.99) compared to experimental group (53.36, SD= 11.28).

The control group indicated a higher mean score in the physical health (47.50) even the median also favoured the control group (47.0 vs. 45.0). The standard deviation was slightly lower in the control group (SD= 7.86, SD=8.38).

The baseline mental health scores for both the groups i.e. experimental and control were similar. Mean for the experimental (42.14) and control (42.77) depicts similar variability

Table 1.2: Comparison of pre intervention scores of Group 1 and Group 2

Variable	Experimental (Group 1)	Control (Group 2)	p-value
MoCA Pre (Mean ±SD)	19.91±3.32	19.18±2.75	0.432
Barthel Index (Mean ± SD)	53.36±11.99	57.59±11.28	0.235
SF-36 Physical (Mean ± SD)	45.32±8.38	47.50±7.86	0.379
SF-36 Mental (Mean ± SD)	42.14±9.20	42.77±9.18	0.821



Graph 1.3: Graphical presentation of Pre intervention score for all outcome measures

Comparison of pre-intervention and post intervention scores of group 1

In the experimental group (Group 1) there is significant improvement observed among all the outcome measure post intervention:

The MoCA scores showed an increment from a mean of 19.91 (SD=3.32) pre intervention to 28.50 (SD=3.57) post intervention, posing a rise in cognitive performance.

Barthel Index scores rose from a mean of 53.36 (SD=11.99) to 61.55 (SD=12.13) showing enhanced functional independence.

Variables	Pre-intervention (Mean ± SD)	Post-intervention (Mean ± SD
MoCA	19.91±3.32	28.50±3.57
Barthel Index	53.36±11.99	61.55±12.13
SF-36 Physical	45.32±8.38	53.77±8.35
SF-36 Mental	42.14±9.20	50.68±9.58

Table 1.3: Comparison of pre and post intervention scores of Group 1

SF-36 Physical domain scores have also improved from 45.32 (SD= 8.38) to 53.77 (SD=8.35) and SF- 36 Mental domain scores increased from 42.14 (SD=9.20) to 50.68 (SD=9.58) specifying better physical and mental health post-intervention.

Graph1.4: Graphical presentation of pre and post values across all outcome measures within Group 1 (Experimental)

Comparison of pre intervention and post intervention scores of group 2

In the control group i.e. Group 2 small changes were observed during the study protocol.

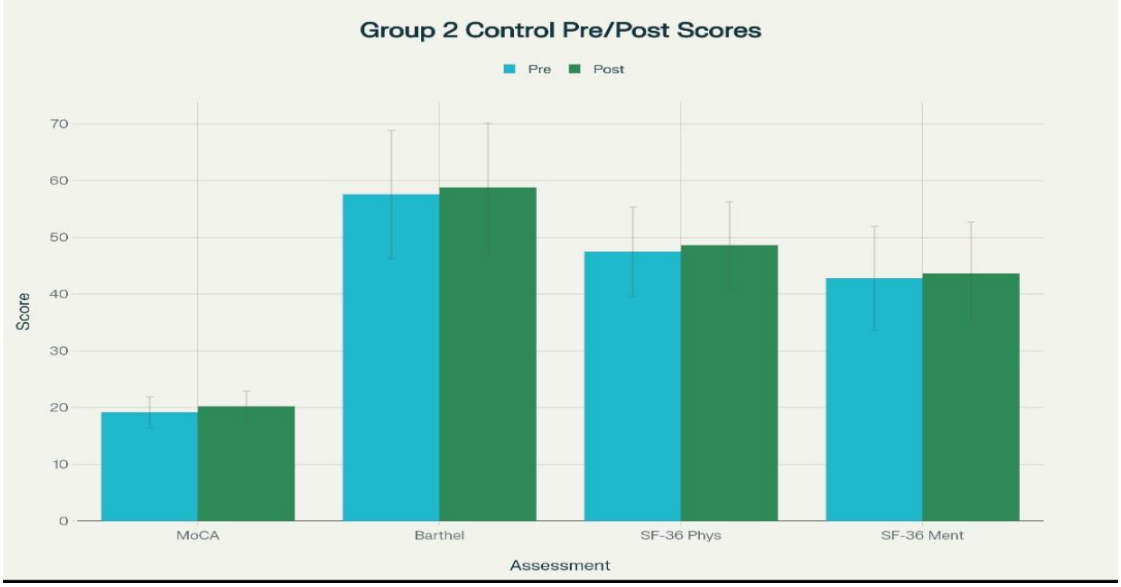
MoCA scored increased from 19.18 (SD=2.75) pre intervention to 20.23(SD=2.74) post intervention reflecting minimal change in cognitive function.

Barthel Index scores showed a minor increase from 57.59 (SD=11.28) to 58.77 (SD=11.35) indicating a slight improvement in functional ability.

SF-36 Physical domain scores rose from 47.50 (SD=7.86) to 48.64 (SD=7.66) and SF-36 Mental domain scores increased from 42.77 (SD=9.18) to 43.64 (SD= 9.12) reflecting limited changes in health related quality of life

Table 1.4: Comparison of pre and post intervention scores of Group 2

Variable	Pre-intervention (Mean± SD	Post-intervention(Mean± SD)	p-value
MoCA	19.18± 2.75	20.23± 2.74	0.087
Barthel Index	57.59± 11.28	58.77± 11.35	0.630
SF- 36 Physical	47.50± 7.86	48.64± 7.66	0.498
SF-36 Mental	42.77±9.18	43.64± 9.12	0.660



Graph 1.5: Graphical representation of pre and post intervention scores for control group

Comparison of mean change scores of group 1 and group 2

The experimental group exhibits higher increase in all domains compared to the control group:

The experimental group showed an average increase of 8.59 points indicating enhancement in cognitive function post intervention. In contrary the control group improved by 1.05 points showing minimal cognitive benefit.

The functional independence in the experimental group rose by an average of 8.19 points reflecting a significant gain in daily living functions. The control group showed only a 1.18 point increase implying that standard care contributed minimally to functional improvement.

The physical health improved by 8.45 points in the experimental group signifying greater benefits to physical quality of life. In the meanwhile, the control group showed a modest 1.14 point increase emphasizing the benefits of this multi-dimensional training.

The experimental group's mental health scores increased by 8.54 points which reflected the improvement in psychological well- being after the intervention. The control group showed an increase of 0.87 points stressing the intervention's role in enhancing mental health.

Table 1.5: Comparison of mean change of scores in group 1 and group 2

Variables	Experimental Group (Mean Change)	Control Group (Mean Change)	p-value
MoCA	+8.59	+1.05	0.036
Barthel Index	+8.19	+1.18	0.054
SF-36 Physical Domain	+8.45	+1.14	0.004
SF-36 Mental Domain	+8.54	+0.87	0.009

8. DISCUSSION

This randomized controlled trial (RCT) showed that patients with acute ischemic stroke who received multidimensional perceptual and cognitive training (experimental group) showed much greater improvements across cognitive function (MoCA), activities of daily living (Barthel Index) and health-related quality of life (SF-36) compared to that of the standard stroke rehabilitation (control group). The mean change scores for the experimental group were substantially higher in all measured outcomes, highlighting the strong positive impact of the integrated intervention.

The findings of this study aligns with several current studies indicating that interventions combining cognitive training and physical rehabilitation yield superior recovery in post-stroke populations (16). For example, research has shown that cognitive behavioural training enhances cortical reorganisation and results in significantly greater improvements of MoCA score versus exercise programs alone. The recent reports on multidimensional team based strategies also reveal improvements in functional independence and faster hospital discharge (17). But there are several systematic reviews on perceptual interventions which points to a lack of strong, high quality RCTs that evaluates the efficacy in stroke rehabilitation, which calls out for more evidence based protocols. This study is unique as it emphasizes simultaneous focus on perceptual, cognitive and functional domains within a structured protocol providing a more wholesome approach than the most previous trials (18).

A key point in this research is the multidimensional training which blends perceptual training, sustained attention tasks and functional exercises in each session. This goes beyond the standard practice by targeting cognition,

perception and daily functioning together using various outcome measures (21). The study is further made strong by the use of detailed, repeatable session protocol and attentive outcome assessment.

The selection of acute stroke patients for this trial was based on the fact that this period presents a window of heightened neuroplasticity, where the brain is most receptive to rehabilitation efforts and adaptive reorganisation (25). Early intervention during this window period has been known to show maximum functional recovery and minimize secondary complications and improve long term outcomes for cognitive and physical domains (22). By the enrolment of patients within 48 hours of onset this study aimed to capture and harness this window period offering intensive multidimensional training when the patient will be benefitted the maximum.

This approach was supported by clinical guidelines and recent research that emphasized the importance of immediate comprehensive rehabilitation following stroke onset.

The sturdy gains observed in the experimental group suggested the substantial practical benefits for clinicians and rehabilitation programs. By integrating the multidimensional perceptual and cognitive training into post stroke care can accelerate cognitive and functional recovery that improved patient's independence and quality of life. The structure and feasibility of the protocol with 10 planned sessions over two weeks supported the adoption within the usual clinical setting. For patients this kind of blended rehabilitation might foster better engagement and motivation which will contribute to better long term outcomes (19).

This research study was conducted using validated outcome measure and maintained participant adherence through a defined session structure. There are several limitations which should be acknowledged: the relatively small sample size, single centre design and short follow up period. These factors limit the generalizability and long term exploration of the findings.

The future research should strive for multicentre trails with larger and more diverse populations and longer follow up periods as well as the addition of objective neurophysiological measures to verify and explore the underlying mechanisms. The availability of more comparative studies across different rehabilitation protocols will be helpful in clarifying the optimal combination and timing of cognitive and perceptual training elements.

9. **Conclusion**

The results strongly supported the efficacy of multidimensional perceptual and cognitive training for stroke rehabilitation which demonstrated improvements in cognition, daily functioning and quality of life compared to the standard protocols. These findings advocated for the integration of holistic and structured intervention programs into clinical practice which will be helpful in advancing the goal of more comprehensive and effective rehabilitation for the stroke survivors.

10. Limitations and Recommendations for future study

Limitation

1. Single center setting limits the generalizability of this study
2. There is a lack of extended follow up which makes it difficult to assess the sustainability of outcomes
3. Variability in stroke severity could possibly have varied impact on the outcomes

Recommendations

1. Larger, multicenter trials with longer intervention and follow up analysis needs to be done
2. The technology can come handy when this kind of protocol are being used in clinical setting
3. Evaluation of the cultural adaptability for wider clinical application can be done.

11. SUMMARY

This randomized controlled trial was conducted to understand the impact of a multidimensional perceptual and cognitive training intervention on patients in the acute phase of ischemic stroke. The research is intended to compare outcomes between an experimental group receiving the protocol and a control group undergoing the standard post stroke rehabilitation. The study participants were selected based on inclusion and exclusion criteria which made sure of clinical stability, acute onset within 48 hours and absence of any other conditions that would interfere with cognitive assessment or rehabilitation.

Both the groups completed a two week intervention which comprised of ten sessions focused on integrated perceptual & cognitive activities while the other group had conventional physical rehabilitation strategies. The study utilized outcome measures which are validated – Montreal Cognitive Assessment (MoCA), Barthel Index and SF-36 Quality of Life Questionnaire which examined the changes in cognition, daily functioning and well-being.

The results showed marked improvements in all domains for the experimental group which received the multidimensional training. These findings suggest that early integrated rehabilitation can accelerate the recovery and foster greater autonomy and psychosocial health in stroke survivors.

This study's design contributed an idea that by employing a structured intervention protocol, standardized assessment tools and statistical analysis. The normality of data was confirmed and parametric tests were selected which made sure reliable interpretation of group differences. The high compliance

rates and clear session structure made the protocol ready to be used in clinical settings.

The study also acknowledged the limitations which might constrain broad generalization of results. This research provided evidence for the efficacy of multidimensional rehabilitation protocols during the early recovery phase of ischemic stroke. By indicating advantages in cognitive, functional and quality of life over standard care, the results support the adoption of structured approach in rehabilitation practice.

The findings highlighted the importance of early intervention and integration of perceptual and cognitive modalities to enhance neuroplasticity and patient outcomes.

12.Statement of Funding

Source of Funding: Not Applicable

Nature of Funding: Not Applicable

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14. ANNEXURES

Annexure 1: Consent Form- English

Study Title: THE EFFECT OF MULTI-DIMENSIONAL PERCEPTUAL & COGNITIVE TRAINING FOR VISUAL & PERCEPTUAL DEFICITS IN PATIENTS WITH ACUTE ISCHEMIC STROKE

Study Number:

Subject's Name: _____ Subject's Initials: _____

Date of Birth / Age: _____
Address of the Subject_____
Qualification _____
Occupation: Student/Self-Employed/Service/Housewife/Others (Please tick as appropriate)

Annual Income of the subject _____ if applicable
Name and address of the nominee(s) and his relation to the subject _____

Please initial box
(Subject)

(i) I confirm that I have read and understood the information sheet dated _____ for the above study and have had the opportunity to ask questions.
(ii) I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.
(iii) I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s)
(iv) I agree to take part in the above study.

Signature (or Thumb impression) of the Subject/Legally Acceptable Representative:
_____
__

Date: _____/ ____/ _____
Signatory's Name: _____

Signature of the Investigator
Date:
Study Investigator's Name: Sanjeevini Barik

Signature of the Witness: _____

Annexure 2- Odia Consent Form

ଚିକିତ୍ସା ସନ୍ଦର୍ଭ ଗବେଷଣାରେ ଅଂଶଗ୍ରହଣ ପାଇଁ ସୂଚିତ ସମ୍ମତି ପତ୍ର

ଗବେଷଣା ଶିରୋନାମା: ଆକ୍ସମିକ ଇସ୍କିମିକ୍ ସ୍ଟ୍ରୋକ୍ ରୋଗୀଙ୍କର ଦୃଷ୍ଟି ଓ ଧାରଣାସମ୍ବନ୍ଧୀୟ ଅସୁବିଧା ପାଇଁ ବହୁମାତ୍ରା କ୍ଷମତା ଧାରଣାତ୍ମକ ଓ ଜ୍ଞାନତାତ୍ମକ ପ୍ରଶିକ୍ଷଣର ପ୍ରଭାବ।

ଗବେଷଣା ସଂଖ୍ୟା:
ବିଷୟ ନାମ: _____
ବିଷୟ ଅନୁସ୍ୱର: _____
ଜନ୍ମତିଥି/ବୟସ: _____
ବିଷୟଙ୍କର ସଂପୂର୍ଣ୍ଣ ଠିକଣା: _____
ଶିକ୍ଷାଗତ ଯୋଗ୍ୟତା: _____
ବୃତ୍ତି: ଛାତ୍ର/ସ୍ୱୟଂ ନିଯୁକ୍ତ/ସରକାରୀ କାର୍ଯ୍ୟଚାରି/ଗୃହିଣୀ/ଅନ୍ୟାନ୍ୟ (ଉପଯୁକ୍ତ ବିକଳ୍ପରେ ଟିକ୍ କରନ୍ତୁ)

ବାର୍ଷିକ ଆୟ (ଯଦି ପ୍ରୟୋଜନ): _____
ଉପାଦେଶ ପାଇଁ ନିଯୁକ୍ତ ବ୍ୟକ୍ତିଙ୍କର ନାମ, ଠିକଣା ଓ ବିଷୟଙ୍କ ସହିତ ସମ୍ପର୍କ:

ଦୟାକରି ବାକ୍ସରେ ଅପ୍ରାଥମିକ ସହି କରନ୍ତୁ (ବିଷୟ):

(i) ମୁଁ ନିଶ୍ଚିତ କରୁଛି ଯେ ମୁଁ _____ ତାରିଖର ତଥ୍ୟ ପତ୍ର ପଢିଛି ଓ ବୁଝିଛି [ ] ଏବଂ ପ୍ରଶ୍ନ କରିବାର ସୁଯୋଗ ପାଇଛି।
(ii) ମୁଁ ବୁଝିପାରୁଛି ଯେ ଏହି ଅଧ୍ୟୟନରେ ମୋର ଅଂଶଗ୍ରହଣ ସ୍ୱଇଚ୍ଛାପୂର୍ଣ୍ଣ ଓ ମୁଁ ଯେ କେବେ ଚାହେଁ ଚାଲିଯାଇପାରିବି, କାହିଁକି ଚାଲିଯାଉଛି ବୁଝାଇବାର ଦରକାର ନାହିଁ [ ] (ମୋ ଚିକିତ୍ସା ସେବା ବା ଆଇନଗତ ଅଧିକାର ଉପରେ କୌଣସି ପ୍ରଭାବ ପଡ଼ିବ ନାହିଁ)।
(iii) ମୁଁ ଏହି ଅଧ୍ୟୟନରୁ ମିଳୁଥିବା ତଥ୍ୟ ବା ପରିଣାମକୁ ଏକାଧିକ ବୈଜ୍ଞାନିକ ଉଦ୍ଦେଶ୍ୟ ପାଇଁ ବ୍ୟବହାର କରିବାକୁ ଅନୁମତି ଦେଉଛି।
(iv) ମୁଁ ଉପରୋକ୍ତ ଅଧ୍ୟୟନରେ ଅଂଶଗ୍ରହଣ କରିବାକୁ ସମ୍ମତି ଦେଉଛି।
(v) ମୁଁ ନିଶ୍ଚିତ କରୁଛି ଯେ ଏହି ଅଧ୍ୟୟନରେ ଅଂଶଗ୍ରହଣକାରୀଙ୍କୁ କୌଣସି ଅସୁବିଧା ବା ବିପଦ ନାହିଁ।

ବିଷୟ/ବୈଧ ସ୍ୱୀକୃତ ପ୍ରତିନିଧିଙ୍କର ସହି (କିମ୍ବା ଅଙ୍ଗୁଠିର ଛାପ):
ତାରିଖ:
ସହିଦାତାଙ୍କ ନାମ: _____

ଗବେଷକଙ୍କ ସହି:
ତାରିଖ:
ଗବେଷକଙ୍କ ନାମ: ସଂଜୀବନୀ ବାରିକ

Annexure 3- MoCA Basic

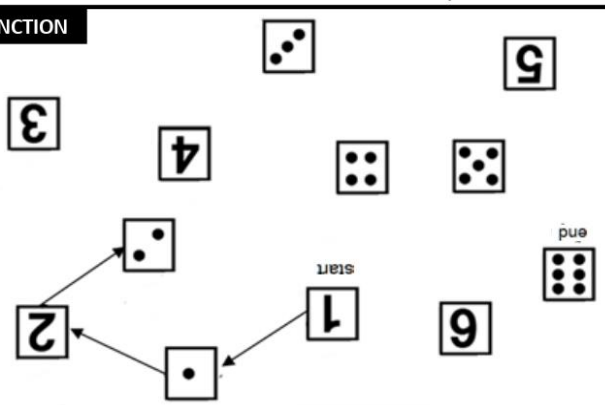
(MoCA-B) BASIC

MoCA COGNITIVE ASSESSMENT

Name _____ Sex _____ Age ____ Education _____

Date of exam _____ Administered by _____

EXECUTIVE FUNCTION — SCORE — START TIME _____ — (/1)



IMMEDIATE RECALL — No point

Perform 2 trials even if 1st trial is successful

	ROSE	CHAIR	HAND	BLUE	SPOON
1st trial					
2nd trial					

FLUENCY — Name maximum numbers of **FRUITS** in 1 minute — (/2)

1..... 2..... 3..... 4..... 5..... 6.....
7..... 8..... 9..... 10..... 11..... 12.....
13..... 14..... 15..... 16..... 17..... 18.....

N items
2 points if N =13 or more
1 point if N =8-12
0 point if N= 7 or less

ORIENTATION [ ] time (± 2 hr) [ ] day [ ] month [ ] year [ ] place [ ] city — (/6)

CALCULATION — (/3)

Provide 3 ways to pay using 1 dollar coins, 5 dollar and 10 dollar bills for an object that costs exactly "13 Dollars" (3 points if 3 ways, 2 points if 2 ways, 1 point if 1 way, 0 point if no correct way)

[ ] 1..... [ ] 2..... [ ] 3.....

ABSTRACTION — (/3)

To what category these objects belong to ? (e.g. orange - banana = fruit)

[ ] train - boat [ ] north - south [ ] drum - flute

DELAYED RECALL — (/5)

Points are awarded for recall with No cue (1point for each item)

Recall with	ROSE	CHAIR	HAND	BLUE	SPOON
No cue	[ ]	[ ]	[ ]	[ ]	[ ]
Recall with category cue	[ ]	[ ]	[ ]	[ ]	[ ]
Recall with multiple choice	[ ]	[ ]	[ ]	[ ]	[ ]

VISUOPERCEPTION — (/3)

Identify drawings. No more than 60 seconds. See complementary sheet.

scissors	T-shirt	banana	lamp	candle
watch	cup	leaf	key	spoon

3 points if N = 9-10
2 points if N = 6-8
1 point if N = 4-5
0 point if N = 0-3
N ___

NAMING Identify animals. See complementary sheet . [ ] zebra [ ] peacock [ ] tiger [ ] butterfly — (/4)

ATTENTION — (/1)

Name the numbers in circles. See complementary sheet. 1 5 8 3 9 2 0 3 9 4 0 2 1 6 8 7 4 6 7 5

ERROR ___N
No point if 2 errors or more

Name the numbers in circles & squares: See complementary sheet. — (/2)

3 8 5 1 3 0 2 9 2 0 4 9 7 8 6 1 5 7 6 4
1 5 8 3 9 2 0 3 9 4 0 2 1 6 8 7 4 6 7 5

ERROR ___N
2 points if 2 errors or less
1 point if 3 errors
0 point if 4 errors or more

END TIME _____

Adapted by : Parunyou Julayanont MD
© MoCA Test Inc.
Created by Z. Nasreddine MD

Final Version June 04, 2014

TOTAL SCORE (/30)
Add 1 point if education < 4 year AND add 1 point if illiterate

TOTAL TIME min sec

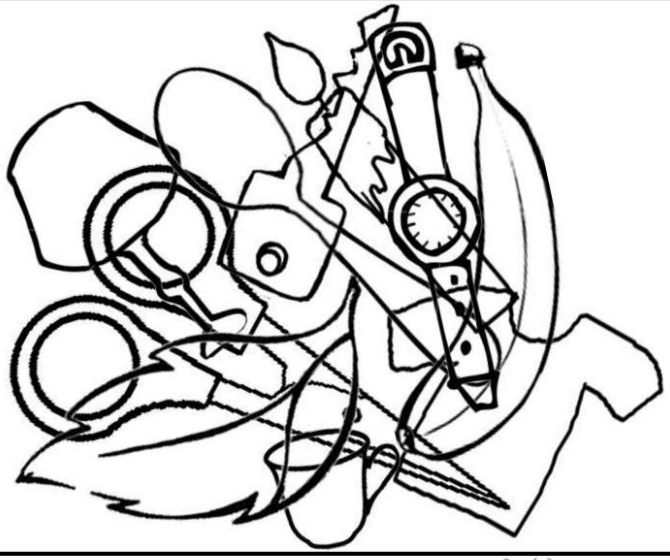
ADMINISTERED BY Barik, Sanjeevini MOCA CERTIFIED RATER ID INBARSA710813031-01

(MoCA-B) BASIC

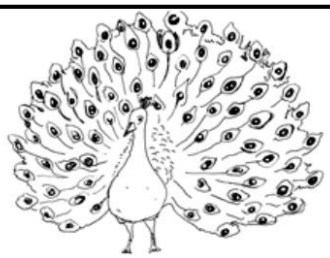
COMPLEMENTARY WORKSHEET

MoCA COGNITIVE ASSESSMENT

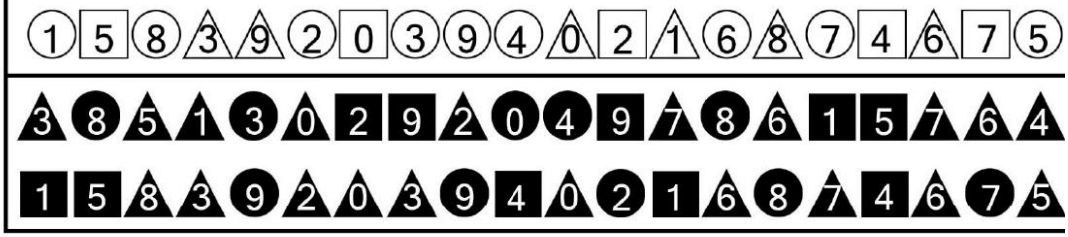
VISUOPERCEPTION



NAMING



ATTENTION



Adapted by: Parunyou Julayanont MD

Final Version June 04, 2014

ADMINISTERED BY Barik, Sanjeevini MOCA CERTIFIED RATER ID INBARSA710813031-01

Annexure -4

Modified Barthel Index (Shah et al. 1989)

Date

Patient name:

First name | Middle name | Last name

Chair/bed transfer:

- 0 - Unable to participate in a transfer. Two attendants are required to transfer the patient with or without a mechanical device.
- 3 - Able to participate, but maximum assistance of one other person is required in all aspects of the transfer.
- 8 - The transfer requires the assistance of one other person. Assistance may be required in any aspect of the transfer.
- 12 - The presence of another person is required either as a confidence measure or to provide supervision for safety.
- 15 - The patient can safely approach the bed walking or in a wheelchair, lock brakes, lift footrests, or position walking aid, move safely to bed, lie down, come to a sitting position on the side of the bed, change the position of the wheelchair, transfer back into it safely and/or grasp aid and stand. The patient must be independent in all phases of this activity.

Ambulation:

- 0 - Dependent in ambulation.
- 3 - Constant presence of one or more assistants is required during ambulation.
- 8 - Assistance is required with reaching aids and/or their manipulation. One person is required to offer assistance.
- 12 - The patient is independent in ambulation but unable to walk 50 meters without help or supervision is needed for confidence or safety in hazardous situations.
- 15 - The patient must be able to wear braces if required, lock and unlock these braces assume standing position, sit down, and place the necessary aids into position for use. The patient must be able to crutches, canes, or a walkarette, and walk 50 meters without help or supervision.

Ambulation/Wheelchair*:

* (If unable to walk)
Only use this item if the patient is rated "0" for Ambulation, and then only if the patient has been trained in wheelchair management.

- ◯ 0 - Dependent on wheelchair ambulation.
- ◯ 1 - Patient can propel self short distances on flat surface, but assistance is required for all other steps of wheelchair management.
- ◯ 3 - Presence of one person is necessary and constant assistance is required to manipulate chair to table, bed, etc.
- ◯ 4 - The patient can propel self for a reasonable duration over regularly encountered terrain. Minimal assistance may still be required in "tight corners" or to negotiate a kerb 100mm high.
- ◯ 5 - To propel wheelchair independently, the patient must be able to go around corners, turn around, maneuver the chair to a table, bed, toilet, etc. The patient must be able to push a chair at least 50 meters and negotiate a kerb.

Stair climbing:

- ◯ 0 - The patient is unable to climb stairs.
- ◯ 2 - Assistance is required in all aspects of chair climbing, including assistance with walking aids.
- ◯ 5 - The patient is able to ascend/descend but is unable to carry walking aids and needs supervision and assistance.
- ◯ 8 - Generally, no assistance is required. At times supervision is required for safety due to morning stiffness, shortness of breath, etc.
- ◯ 10 - The patient is able to go up and down a flight of stairs safely without help or supervision. The patient is able to use hand rails, cane or crutches when needed and is able to carry these devices as he/she ascends or descends.

Toilet transfers:

- ◯ 0 - Fully dependent in toileting.
- ◯ 2 - Assistance required in all aspects of toileting.
- ◯ 5 - Assistance may be required with management of clothing, transferring, or washing hands.
- ◯ 8 - Used at night but assistance is required for emptying and cleaning.
- ◯ 10 - The patient is able to get on/off the toilet, fasten clothing and use toilet paper without help. If necessary, the patient may use a bed pan or commode or urinal at night but must be able to empty it and clean it.

Bowel control:

- ○ 0 - The patient is bowel incontinent.
- ○ 2 - The patient needs help to assume appropriate position, and with bowel movement facilitatory techniques.
- ○ 5 - The patient can assume appropriate position but cannot use facilitatory techniques or clean self without assistance and has frequent accidents. Assistance is required with incontinence aids such as pad, etc.
- ○ 8 - The patient may require supervision with the use of suppository or enema and has occasional accidents.
- ○ 10 - The patient can control bowels and has no accidents, can use suppository, or take an enema when necessary.

Bladder control:

- ○ 0 - The patient is dependent in bladder management, is incontinent, or has indwelling catheter.
- ○ 2 - The patient is incontinent but is able to assist with the application of an internal or external device.
- ○ 5 - The patient is generally dry by day, but not at night and needs some assistance with the devices.
- ○ 8 - The patient is generally dry by day and night but may have an occasional accident or need minimal assistance with internal or external devices.
- ○ 10 - The patient is able to control bladder day and night, and/or is independent with internal or external devices.

Bathing:

- ○ 0 - Total dependence in bathing self.
- ○ 1 - Assistance is required in all aspects of bathing, but patient is able to make some contribution.
- ○ 3 - Assistance is required with either transfer to shower/bath or with washing or drying; including inability to complete a task because of condition or disease, etc.
- ○ 4 - Supervision is required for safety in adjusting the water temperature, or in the transfer.
- ○ 5 - The patient may use a bathtub, a shower, or take a complete sponge bath. The patient must be able to do all the steps of whichever method is employed without another person being present.

Dressing:

- ○ 0 - The patient is dependent in all aspects of dressing and is unable to participate in the activity.
- ○ 2 - The patient is able to participate to some degree, but is dependent in all aspects of dressing.
- ○ 5 - Assistance is needed in putting on, and/or removing any clothing.
- ○ 8 - Only minimal assistance is required with fastening clothing such as buttons, zips, bra, shoes, etc.
- ○ 10 - The patient is able to put on, remove, corset, braces, as prescribed.

Personal hygiene (Grooming):

- ○ 0 - The patient is unable to attend to personal hygiene and is dependent in all aspects.
- ○ 1 - Assistance is required in all steps of personal hygiene, but patient able to make some contribution.
- ○ 3 - Some assistance is required in one or more steps of personal hygiene.
- ○ 4 - Patient is able to conduct his/her own personal hygiene but requires minimal assistance before and/or after the operation.
- ○ 5 - The patient can wash his/her hands and face, comb hair, clean teeth and shave. A male patient may use any kind of razor but must insert the blade, or plug in the razor without help, as well as retrieve it from the drawer or cabinet. A female patient must apply her own make-up, if used, but need not braid or style her hair.

Feeding:

- ○ 0 - Dependent in all aspects and needs to be fed, nasogastric needs to be administered.
- ○ 2 - Can manipulate an eating device, usually a spoon, but someone must provide active assistance during the meal.
- ○ 5 - Able to feed self with supervision. Assistance is required with associated tasks such as putting milk/sugar into tea, salt, pepper, spreading butter, turning a plate or other “set up” activities.
- ○ 8 - Independence in feeding with prepared tray, except may need meat cut, milk carton opened or jar lid etc. The presence of another person is not required.
- ○ 10 - The patient can feed self from a tray or table when someone puts the food within reach. The patient must put on an assistive device if needed, cut food, and if desired use salt and pepper, spread butter, etc.

Total score:

Annexure-5

SF-36 QUESTIONNAIRE

Name:_____ **Ref. Dr:**_____ **Date:** _____

ID#: _____ **Age:** _____ **Gender: M / F**

Please answer the 36 questions of the **Health Survey** completely, honestly, and without interruptions.

GENERAL HEALTH:
In general, would you say your health is:

◯ Excellent ◯ Very Good ◯ Good ◯ Fair ◯ Poor

Compared to one year ago, how would you rate your health in general now?

◯ Much better now than one year ago
◯ Somewhat better now than one year ago
◯ About the same
◯ Somewhat worse now than one year ago
◯ Much worse than one year ago

LIMITATIONS OF ACTIVITIES:
The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.
◯ Yes, Limited a lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Lifting or carrying groceries
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Climbing several flights of stairs
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Climbing one flight of stairs
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Bending, kneeling, or stooping
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Walking more than a mile
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Walking several blocks
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Walking one block
◯ Yes, Limited a Lot ◯ Yes, Limited a Little ◯ No, Not Limited at all

Bathing or dressing yourself

◯Yes, Limited a Lot ◯Yes, Limited a Little ◯No, Not Limited at all

PHYSICAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

Cut down the amount of time you spent on work or other activities

◯Yes ◯No

Accomplished less than you would like

◯Yes ◯No

Were limited in the kind of work or other activities

◯Yes ◯No

Had difficulty performing the work or other activities (for example, it took extra effort)

◯Yes ◯No

EMOTIONAL HEALTH PROBLEMS:

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Cut down the amount of time you spent on work or other activities

◯Yes ◯No

Accomplished less than you would like

◯Yes ◯No

Didn't do work or other activities as carefully as usual

◯Yes ◯No

SOCIAL ACTIVITIES:

Emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

◯Not at all ◯Slightly ◯Moderately ◯Severe ◯Very Severe

PAIN:

How much bodily pain have you had during the past 4 weeks?

◯None ◯Very Mild ◯Mild ◯Moderate ◯Severe ◯Very Severe

During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

◯Not at all ◯A little bit ◯Moderately ◯Quite a bit ◯Extremely

ENERGY AND EMOTIONS:
These questions are about how you feel and how things have been with you during the last 4 weeks. For each question, please give the answer that comes closest to the way you have been feeling.

Did you feel full of pep?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Have you been a very nervous person?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Have you felt so down in the dumps that nothing could cheer you up?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Have you felt calm and peaceful?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Did you have a lot of energy?
- ◯ All of the time
- ◯ Most of the time
- ◯ A good Bit of the Time
- ◯ Some of the time
- ◯ A little bit of the time
- ◯ None of the Time

Have you felt downhearted and blue?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Did you feel worn out?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Have you been a happy person?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

Did you feel tired?

- All of the time
- Most of the time
- A good Bit of the Time
- Some of the time
- A little bit of the time
- None of the Time

SOCIAL ACTIVITIES:
During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

- All of the time
- Most of the time
- Some of the time
- A little bit of the time
- None of the Time

GENERAL HEALTH:
How true or false is each of the following statements for you?

I seem to get sick a little easier than other people
Definitely true | Mostly true | Don't know | Mostly false | Definitely false

I am as healthy as anybody I know
Definitely true | Mostly true | Don't know | Mostly false | Definitely false

I expect my health to get worse
Definitely true | Mostly true | Don't know | Mostly false | Definitely false

My health is excellent
Definitely true | Mostly true | Don't know | Mostly false | Definitely false

Annexure- 6

6% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography
- Quoted Text
- Cited Text
- Small Matches (less than 8 words)

Match Groups

22 Not Cited or Quoted 6%
Matches with neither in-text citation nor quotation marks

0 Missing Quotations 0%
Matches that are still very similar to source material

0 Missing Citation 0%
Matches that have quotation marks, but no in-text citation

0 Cited and Quoted 0%
Matches with in-text citation present, but no quotation marks

Top Sources

6% Internet sources
4% Publications
0% Submitted works (Student Papers)

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1 Integrity Flag for Review

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turnitin Page 2 of 28 - Integrity Overview Submission ID trn:oid:::1:3345456616

Annexure-7

Participant Assessment Sheet

Section A: General Information

Participant ID: _____

Name:_____

Age: _____

Gender: _____

Type of Stroke: _____

Side Affected: _____

Date of Stroke Onset: _____

Group Allocation: _____

Date of Recruitment: _____

Section B: Inclusion/Exclusion Checklist

[ ] Yes [ ] No Confirmed diagnosis of acute stroke

[ ] Yes [ ] No Onset within 2 weeks

[ ] Yes [ ] No Visual-perceptual deficits noted

[ ] Yes [ ] No Aged 40-65 years

[ ] Yes [ ] No Able to follow simple commands (no severe aphasia/cognitive deficits)

[ ] Yes [ ] No No other neurological/psychiatric disorders

Section C: Baseline Assessment (Pre-Intervention)

Tool	Domain	Score	Interpretation
MoCA	Cognitive Function		
Modified Barthel	Functional Independe		

Index	nce
SF-36	Quality of Life (Total)
	Physical Component Summary (PCS)
	Mental Component Summary (MCS)

Section D: Post-Intervention Assessment (After 2 Weeks)

Tool	Domain	Score	Interpretation
MoCA	Cognitive Function		
Modified Barthel Index	Functional Independence		
SF-36	Quality of Life (Total)		
	Physical Component Summary (PCS)		
	Mental Component Summary (MCS)		

Section E: Therapist Observations

Compliance with Sessions: [ ] Completed All [ ] Missed Sessions [ ] Dropped Out

Remarks: _____

Participant Responsiveness: _____

Adverse Events (if any): _____

Section F: Signature & Date

Therapist's Name: _____

Date of Final Assessment: _____

Signature: _____

Annexure 8- Ethical Report

ABSMARI ETHICS COMMITTEE

ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH INSTITUTE, BHUBANESWAR, ODISHA

CDSCO Reg. No.: ECR/1981/Inst/OD/24

Prof. (Dr.) E. Venkata Rao
Chairperson

Mr. Chinmaya Kumar Patra
Member Secretary

Ref. No. ABSMARI/IEC/2025/145

Date: 02/05/2025

APPROVAL LETTER

APPENDIX- VIII

To,

SANJEEVINI BARIK
ABSMARI
273, PAHAL, BHUBANEWAR-752101

Protocol Title: The Effect of Multi-Dimensional Perceptual and Cognitive training for visual and perceptual deficits in patients with Acute ischemic stroke: A Randomised Controlled Trial(RCT)

Protocol ID.: ABS-IEC-2025-PHY-068

Subject: Approval for the conduct of the above referenced study

Dear Mr./Ms./Dr **SANJEEVINI BARIK**
With reference to your Submission letter dated 06/01/2025 the ABSMARI IEC has reviewed and discussed your application for conduct of the study on dated 25/04/2025.

The following documents were reviewed and discussed

S.N.	Documents	Document (Version/Date)
1	IEC Application Form	25/04/2025
2	Informed Consent Form	25/04/2025
3	Undertaking form PI	25/04/2025
4	CRF	25/04/2025
5	COI from the Investigators	25/04/2025

The following members were present at meeting held on 25-04-2025

ABSMARI ETHICS COMMITTEE Dt..... BHUBANESWAR

1

Annexure 9- Master Chart

Participant ID	Group	Age	Gender	Barthel Index (Pre)	Barthel Index (Post)	SF-36 Physical (Pre)	SF-36 Physical (Post)	SF-36 Mental (Pre)
1	Experimental	64	Male	75	82	59	66	50
2	Experimental	70	Male	40	49	39	48	36
3	Experimental	55	Male	45	52	53	61	56
4	Experimental	73	Male	69	78	39	48	50
5	Experimental	58	Female	48	58	46	56	31
6	Experimental	69	Male	54	61	57	64	55
7	Experimental	51	Female	48	55	50	59	33
8	Experimental	64	Male	56	66	41	50	56
9	Experimental	70	Female	43	51	36	44	35
10	Experimental	62	Female	59	69	47	55	51
11	Experimental	58	Male	44	51	38	47	33
12	Experimental	71	Male	75	82	57	65	31
13	Experimental	45	Female	47	54	50	60	35
14	Experimental	50	Female	59	66	43	50	49
15	Experimental	65	Male	40	47	44	53	30
16	Experimental	50	Male	48	58	33	42	48
17	Experimental	63	Male	52	62	46	55	44
18	Experimental	75	Female	40	48	35	44	47
19	Experimental	54	Male	48	57	56	65	30
20	Experimental	54	Female	72	82	37	44	38
21	Experimental	58	Male	71	78	35	42	40
22	Experimental	66	Male	41	48	56	65	49
23	Control	55	Male	62	64	37	39	33
24	Control	64	Male	40	40	46	46	32
25	Control	46	Female	47	49	57	58	51
26	Control	64	Female	52	54	44	44	48
27	Control	64	Male	43	45	56	58	54
28	Control	68	Female	71	71	44	44	36
29	Control	73	Male	63	63	57	58	39
30	Control	59	Male	73	74	35	37	33
31	Control	63	Male	41	42	50	50	49
32	Control	55	Female	68	70	48	48	48
33	Control	67	Male	59	61	41	43	46
34	Control	57	Male	73	74	42	42	32
35	Control	71	Female	60	62	39	41	41
36	Control	49	Male	54	56	36	38	31
37	Control	64	Female	55	55	56	58	56
38	Control	55	Female	68	70	56	57	56
39	Control	52	Male	74	76	51	52	53
40	Control	47	Male	61	61	43	45	40

41	Control	59	Female	40	42	51	53	37
42	Control	71	Male	55	55	57	58	37
43	Control	67	Male	45	45	59	59	57
44	Control	45	Male	63	64	40	42	32