

## Efficacy of the Bobath Concept in Improving Performance in Activities of Daily Living in Patients after Stroke: A Literature Review

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### Abstract

Despite its long background, since the 1940s, and its wide use, there are few studies regarding the results of Neurodevelopmental Treatment (NDT) in stroke patients. Objectives: To investigate the efficacy of the Bobath concept in the functionality and independence in activities and the use of upper limb compared to the usual treatment in the neurological rehabilitation after stroke. Design: Systematic review of randomized clinical trials, controlled trials, pilot studies, quasi-experimental studies and previous systematic reviews. Population: Adults after stroke. Materials and Methods: A systematic review of the literature on the Bobath concept from the first available publication in 2012 until December of 2022 was performed, consulting Pubmed, PEDro, Epistemonikos, CercaTot UVic, Sciencedirect and Cochrane Library databases. PEDro scale was used to determine methodological quality. Intervention: Treatment based on the Bobath concept compared to other or no interventions. Outcomes: Activities of Daily Living and upper limb motor activity. Results: Nine clinical trials and two systematic reviews were included; all but two studies compared the Bobath concept with another intervention. PEDro scale scores ranged from 3 to 7. There is limited evidence of the superiority of Bobath over other interventions, especially amplitude exercises and stretching, in producing significant changes in upper limb activity. Therapy based on Bobath concept is less effective than robotics and task-oriented training. The superiority of Bobath concept or any other therapeutic approach cannot be concluded regarding Activities of Daily Living and quality of life of stroke patients. Conclusions: No solid documentation was found describing the superiority of neurodevelopmental treatment, nor of any other advanced intervention, to consider it recommended for the improvement of functionality and quality of life after stroke. Methodological aspects of the selected studies are presented for future research. It is strongly recommended that future clinical trials analyze the functional benefits of the Bobath concept.

**Keywords:** Stroke; Bobath concept; NDT; Neurodevelopmental treatment; Activities of daily living stroke; Neuro rehabilitation; Upper limb; Systematic review

### Introduction

Stroke is one of the leading causes of death and disability worldwide. According to Campbell B.C.V. & Khatri P. (2020), one in four individuals will be affected at some point in their lifetime. Feigin VL, Nguyen G, Cercy K et al. (2018) indicate that stroke is the second leading cause of death and the third leading cause of disability in adults globally.

From the onset of the stroke, much impairment in activity are presented. An analysis of data indicated that 75% of patients were dependent in Activities of Daily Living (ADLs) at the onset of the stroke. Kelly-Hayes argued that out of 795,000 patients, 26% experienced some form of dependence in Basic Activities of Daily Living (BADLs), while 50% had motor deficits due to hemiparesis.

### Methods

#### Search strategy and selection criteria

The following databases were used: PubMed, PEDro, Epistemonikos, CercaTot UVic, Sciencedirect, and Cochrane Library. The literature review was conducted using the terms "Bobath" OR "Bobath concept" OR "Neurodevelopmental Treatment" AND "Stroke" OR "Cerebrovascular Accident." In the CercaTot UVic, Scopus, PEDro, and Cochrane Library databases, the terms were entered as free language, while in PubMed and Epistemonikos; these terms were also entered as Medical Subject Headings (MeSH). Therefore, a controlled language equation was formed to facilitate this search in PubMed: ("Bobath" [MeSH] OR "Bobath concept" [MeSH] OR "Neurodevelopmental treatment" AND ("Stroke" [MeSH] OR "CVA" [MeSH] OR "Cerebrovascular Accident" [MeSH]) AND "Activities of Daily Living" [MeSH] [1]. To retrieve

clinical trials, the results were filtered using the terms "clinical trial," "randomized clinical trial," "Clinical Study," "Comparative Study," and "Systematic Review." The DeCS (Health Sciences Descriptors) tool was used to create the equation. The search was conducted in all databases up until December 2022. Before completing the final analysis, a search was performed again to retrieve additional studies for inclusion.

#### Inclusion criteria

The following inclusion criteria were applied to locate the desired studies:

- Randomized controlled trials (RCTs), quasi-experimental studies, pilot studies, systematic reviews, and meta-analyses evaluating the effectiveness of the Bobath concept [2].
- Patients with central nervous system impairment.
- Adults ( $\geq 18$  years).
- Articles written in English or Spanish. Exclusion Criteria

The following exclusion criteria were applied in the second

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screening: Studies on the treatment of patients with neurological disorders other than stroke or neurodegenerative diseases.

- Randomized controlled trials with a multimodal approach, using the Bobath concept in combination with another rehabilitation technique.
- Studies presenting the same results in different article. Only one of the two articles studying variables that match the PICO question was included.
- Randomized controlled trials that evaluated outcomes unrelated to upper limb motor function, spasticity, and ADL performance.
- Articles published before January 2012.
- Unpublished randomized controlled trials (protocols) [3].

### Characteristics of the studies

A total of 298 and 1,867 subjects participated in the trials and systematic reviews, respectively. Regarding the post-stroke phase, there is variability, although most studies were conducted on subjects in the acute phase. Two studies involved subjects in the subacute phase, while the rest included participants in both the subacute and chronic phases. The results table contains all the details about the intervention protocols; the treatment duration ranged from 2 to 12 weeks, with 3 to 5 sessions of 30 minutes to 1 hour per week [4].

### Effectiveness of the Bobath concept compared to other interventions

The results of the trials have been grouped according to their main key variables: Activities of Daily Living (ADLs) and quality of movement, motor function, and upper limb use. The measurement scales used as the measurement system are also presented.

#### Activities of daily living

Out of the 9 selected studies, seven present results on performance in ADLs. Some use measurement parameters such as scales that exclusively assess ADLs, such as the Barthel Index while others use scales that include items on quality of life (FIM), functionality (FSS), or the participant's perception of their health (NHP) [5].

Two other trials conclude similar results for the control group intervention and the Bobath concept. The control group interventions include Constraint- Induced Movement Therapy (CIMT) and Nintendo-Wii training. Two studies highlight the superiority of treatments from the Motor Relearning Program and Dynamic Neuromuscular Stabilization (DNS) over Bobath-based core exercise. The remaining trials distinguish the efficacy of the Bobath concept [6]. Mikołajewska indicates improvement in transfers, gait, and stair climbing, confirming the same in 2015 with 28.57% recovery of ADLs. Finally, Yazıcı et al. emphasize greater functional recovery with Bobath compared to standard physiotherapy rehabilitation in the early phase of stroke. Díaz-Arribas in improving ADLs after a stroke could be established, according to six out of eight studies. The other two presented studies highlight the superiority of mobility training using robotics, although the results are not sustained in the medium to long term [7].

Pathak conducted a systematic review in which they concluded that the superiority of Bobath over other techniques could not be demonstrated, except for Proprioceptive Neuromuscular Facilitation (PNF) and orthopedic approaches, as the results were similar in terms of functional improvement [8].

### Motor control and use of the upper extremity

Out of the 9 clinical trials, five reported results on the motor function of the upper extremities. The measurement scales used assessed dexterity (MESUPES Scale 47, WMFT Test 47), coordination and range of motion amount of spontaneous use of the affected upper extremity (MAL-28 47), upper extremity function or factors indirectly contributing to the above factors such as spasticity [9].

Four studies showed superior results with Bobath treatment compared to the control group. The standard intervention included exercises for strength, range of motion, stretching, and functional activities, or the trial was conducted without a control group. Statistically significant changes were observed in muscle tone and hand function, with 87.71% recovery of upper extremity mobility. Finally, the study by Huseyinsinoglu demonstrated that CIMT therapy resulted in greater benefits in quality of movement and amount of use of the affected upper extremity compared to Bobath therapy [10].

Díaz-Arribas presented 9 studies on motor control and dexterity of the upper extremity. After analyzing the results, it was shown that other techniques such as forced use of the affected upper extremity through robotics or CIMT therapy in combination with forced use techniques were more effective compared to the Bobath concept.

Pathak also reached the same conclusion. After two weeks of CIMT treatment and forced use of the affected upper extremity, more favorable motor improvements were observed. Greater upper extremity strength was observed with the use of robotics. Additionally, upper extremity training (BASIS) through repetitive tasks was more effective in improving its function [11].

### Discussion

This systematic review is based on evaluating the effects of the Bobath concept compared to other rehabilitation techniques in stroke patients. Nine clinical trials and two systematic reviews, conducted up until December 2022 with a total of 2,165 participants, were included in the research. The results of the two systematic review were decided to be included in this review. Both studies confirm the same result regarding ADLs: the superiority of the Bobath concept over other neurorehabilitation techniques in stroke cannot be concluded. Now, two years later, additional studies are added to obtain solid scientific evidence on the subject [12].

A systematic review from 2009 nt way ( $\geq 4$  on the PEDro scale is considered high methodological quality). Furthermore, it included four studies that do not meet the eligibility criteria of the present review, combining the Bobath concept with another intervention. A new systematic review published this month aligns with the present review.

After a stroke, the Bobath therapy is less effective than robotics and task-oriented training, and equally or less effective than treatment involving upper limb movements for mobility improvement. Regarding the latter, the present review disagrees, as it concludes that Bobath is more effective than amplitude exercises and stretching. Finally, according to a meta-analysis on the effectiveness of various stroke interventions, Bobath therapy has a statistically significant negative effect on functionality compared to standard treatment, and positive and significant effects on the upper limb and its activity in two included studies without a control group. It should be noted that this meta-analysis includes studies with multimodal use of Bobath and only patients in the acute phase, compared to the present review [13].

In relation to the obtained results, the average duration of the

interventions ranged from 2 to 12 weeks, significantly shorter than in daily practice. This represents a disparity between short-term data and long-term outcomes. In one study, the greater effectiveness of robotics compared to other techniques, including the Bobath concept, is highlighted only when applied intensively. Therefore, it is essential to conduct trials with treatments administered at the same intensity. It is possible that the Bobath approach to normalize movement patterns does not provide functional results in the upper limb. Therefore, it should be considered as just one of many tools available to an Occupational Therapist to address individual deficits.

Regarding the benefits of the study, it is pertinent to value the assessment scales. The FIM scale is widely used as an assessment tool for ADLs. It is highly reliable, with an interrater reliability (ICC) of 0.83-0.96. The Turkish version of the TIS scale has previously been evaluated for its reliability and validity in stroke patients by Sag. Additionally, it should be noted that this is the first systematic review to date on the effectiveness of Bobath in ADLs, upper limb motor function, and quality of life in post-stroke patients from an Occupational Therapy perspective.

## Conclusion

The focus of literature over the past 5 years regarding the Bobath concept has been on studies evaluating its effectiveness and defining its theoretical framework. This systematic review highlights that the superiority of the concept or any other therapeutic approach over Activities of Daily Living (ADLs) and quality of life in stroke patients cannot be concluded. Regarding motor control of the upper limb, there is limited evidence of the superiority of the Bobath concept compared to other interventions in producing significant changes. On the other hand, therapy based on the Bobath concept is less effective than robotics and task-oriented training. The review confirms the need for further research to clarify the effectiveness of applying the Bobath concept in stroke patients.

## Limitations and ethical aspects

Despite including recent studies on the effectiveness of the Bobath concept, trials with methodological errors are still being conducted. A primary limitation observed was the lack of previous studies on the topic. There is little research on the effectiveness of Neurodevelopmental Treatment (NDT) as an intervention in stroke patients. Few studies have been conducted in the past 5-10 years, with most of them being carried out between 2000 and 2010, which hinders the collection of data on the effectiveness of a treatment that remains valid today. Furthermore, most of them focus on mobility, balance, and gait as variables, with functionality as a secondary outcome.

The lack of a standardized protocol regarding the content of the intervention itself is another hindrance, as Bobath is not a set of techniques but a concept, making it difficult to standardize the intervention among therapists or in clinical trials. Future RCTs should analyze the therapy content and consider the intensity of the administered intervention to promote communication between academics and therapists.

The carry-over effect was also not considered in some studies, so it is unknown whether the improvement was sustained after the intervention. Long-term effects in larger groups need to be investigated to draw categorical conclusions. The lack of blinding of subjects and therapists in all studies, and of the evaluator in five out of the nine trials, is another significant limitation. Moreover, using different therapists in each group is challenging to fulfill in treatment studies,

as a single therapist may have been predisposed to favor one treatment over another. Finally, the studies mainly include patients in the acute and subacute stages with only 3 studies on chronic patients, and in two of them without a control group. It is crucial to conduct more studies on chronic patients and examine the long-term effects of treatments.

Finally, the small sample size and the lack of a control group represent two other limitations of the study. This review confirms the need for further studies on the effectiveness of the Bobath concept in post-stroke patients, characterized by higher methodological quality with double-blind, randomized controlled trials. Additionally, longer follow-up periods are essential. Furthermore, treatment fidelity in future research could be achieved by administering therapy by therapists trained in the Bobath concept and seeking expert consultation from an IBITA instructor. Finally, trials investigating the contribution of treatment to functional autonomy, motor control, and long-term quality of life are recommended.

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## Conflict of Interest

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## References

1. Campbell BCV, Khatri P (2020) Stroke. *Lancet* 396:129-142.
2. Feigin V, Nguyen G, Cercy K (2022) Global, regional, and country-specific lifetime risks of stroke, 1990 and 2016. *N Engl J Med* 379:2429-2437.
3. Sacco R, Kasner S, Broderick J, Caplan L, Connors J, et al. (2013) An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke* 44: 2064-2089.
4. Zhang LF, Yang J, Hong Z, Yuan GG, Zhou BF, et al. (2003) Proportion of different subtypes of stroke in China. *Stroke* 34:2091-96.
5. Katan M, Luft A (2022) Global Burden of Stroke. *Semin Neurol* 38: 208-211.
6. Hand PJ, Kwan J, Lindley RI, Dennis MS, Wardlaw JM (2006) Distinguishing between stroke and mimic at the bedside: the Brain Attack Study. *Stroke* 37:769-775.
7. Asplund K, Karvanen J, Giampaoli S, Jousilahti P, Niemelä M, et al. (2009) Relative risks for stroke by age, sex, and population based on follow-up of 18 European populations in the MORGAM Project. *Stroke* 40: 2319-2326.
8. Murray CJ, Atkinson C, Bhalla K, Birbeck G, Burstein R, et al. (2013) U.S. Burden of Disease Collaborators. The state of US health, 1990-2010: burden of diseases, injuries, and risk factors. *JAMA* 310:591-608.
9. Writing Group Members, Mozaffarian D, Benjamin EJ, Go AS, et al. (2016) Heart disease and stroke statistics-2016 update: a report from the American Heart Association. *Circulation* 133: 338-360.
10. Kissela BM, Khoury JC, Alwell K, Moomaw CJ, Woo D, et al. (2012) Age at stroke: temporal trends in stroke incidence in a large, biracial population. *Neurology* 79:1781-1787.
11. O'Donnell MJ, Xavier D, Liu L, Zhang H, Chin SL, et al. (2010) Risk factors for ischemic and intracerebral hemorrhagic stroke in 22 countries: a case-control study. *Lancet* 376:112-23.
12. Chugh SS, Havmoeller R, Narayanan K, Singh D, Rienstra M, Benjamin EJ, et al. (2014) worldwide epidemiology of atrial fibrillation: a Global Burden of Disease 2010 Study. *Circulation* 129:837-847.
13. Tu HT, Campbell BC, Christensen S, Collins M, De Silva DA, et al. (2010) Pathophysiological determinants of worse stroke outcome in atrial fibrillation. *Cerebrovascular diseases* 30:389-395.