
**CLINICAL BOTTOM LINE:**

The results of this study can offer insight for occupational therapists debating the use of the Bobath approach for patients with hemiparesis in the spasticity or relative recovery stages secondary to acute stroke. Clinicians should note that a Bobath and orthopedic approach can result in improved function and decreased impairments, and that the Bobath approach provides additional improvements at different motor recovery stages. The Bobath approach is effective in improving motor function and subjective ratings of function for patients with hemiparesis secondary to acute stroke. If clinicians aim to improve lower extremity muscle tone, they can be assured that the Bobath approach resulted in better tone control than the orthopedic approach. Also, when analyzing outcome measures, it can be noted that the Stroke Impact Scale (SIS), displays clinically meaningful change if a variation of 10 or more points is noted. If clinicians choose to apply the Bobath approach, based on the results of this study, it should be applied in acute settings for patients with acute stroke and hemiparesis, as the information cannot be generalized to patients with chronic stroke.

Although the randomized controlled trial design of this study provides for control of several variables, clinicians should understand that extraneous interventions and the lack of the most appropriate analytic methods may have skewed the results of this study. Further, the effect of spontaneous recovery on function and impairments as well as the varying techniques between therapists providing intervention may have affected the results and would possibly produce varying results if applied in clinical practice. Though this study did demonstrate effectiveness of Bobath for various outcome measures, the study provided limited information on how the intervention was provided, making replication of the intervention difficult. The effect of spontaneous recovery and study biases make it difficult to determine whether interventions alone produced the results. Clinicians would be advised to search for future studies with fewer biases and more detailed intervention descriptions to determine exact effectiveness of both the Bobath and orthopedic approaches. Clinicians interested in researching the effectiveness of the Bobath approach are advised to control for extraneous variables, use a larger sample size, use objective outcome measures, and provide detailed descriptions of interventions to aid readers in intervention planning.
RESEARCH OBJECTIVE(S)
List study objectives.

Evaluate the efficacy of the Bobath treatment vs. orthopedic treatment on reducing impairment and increasing function for patients with acute stroke at hyper tonic or relative recovery stages; compare Bobath to orthopedic treatment to determine if Bobath is a more effective approach.

DESIGN TYPE AND LEVEL OF EVIDENCE:
Level I: Randomized controlled trial

SAMPLE SELECTION
How were subjects recruited and selected to participate? Please describe.

A convenience sample was used to recruit subjects from an inpatient rehabilitation department of a medical center. Interviews and a review of medical charts were performed to identify each subject’s diagnosis, age, sex, side affected by hemiparesis, stroke type, and number of days since hemiparesis onset. Information was assessed by a single physical therapist and subjects were selected to participate if they met the inclusion criteria and signed an informed consent form. Twenty-one patients with spasticity and 23 patients with relative recovery were then randomly assigned to a Bobath or orthopedic group by an independent person who selected a sealed envelope for group assignment before the intervention began.

Inclusion Criteria
Inclusion criteria for this study included a diagnosis of hemiparesis due to acute stroke; a Brunnstrom motor recovery stage of 2, 3, 4, or 5 for lower extremities; a willingness to take part in the study; and the ability to effectively communicate. Inclusion criteria for the spasticity group were a Brunnstrom motor recovery stage of 2 or 3 and inclusion into the relative recovery group was a Brunnstrom stage of 4 or 5.

Exclusion Criteria
Subjects were excluded from the study if they did not meet any part of the inclusion criteria, such as were unable to communicate, refused to participate, scored a Brunnstrom motor stage of 1 or 6 for lower extremities, or did not sign an informed consent form.

SAMPLE CHARACTERISTICS
N= (Number of participants taking part in the study) 44
#/ (%) Male 28/64%  /
#/ (%) Female 16/36%

Ethnicity NR

Disease/disability diagnosis Hemiparesis secondary to stroke
### INTERVENTION(S) AND CONTROL GROUPS

*Add groups if necessary*

**Group 1: Experimental - Orthopedic approach**

| Brief description of the intervention | Orthopedic approach with spasticity, $n = 11$  
|--------------------------------------|----------------------------------|
| Passive, assistive, active, and progressive resistive exercise.  
| Focus was to produce joint motion under control and decision of the subject.  
| Functional activities of rolling, sitting, transferring, gait, and repetition of specific activities were practiced.  
| Gait training used a horizontal support bar for the subject’s unaffected side. |

<table>
<thead>
<tr>
<th>How many participants in the group?</th>
<th>Orthopedic approach with relative recovery, $n = 12$</th>
</tr>
</thead>
</table>
| Orthopedic approach with spasticity, $n = 11$  
| Orthopedic approach with relative recovery, $n = 12$ |

<table>
<thead>
<tr>
<th>Where did the intervention take place?</th>
<th>NR</th>
</tr>
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<table>
<thead>
<tr>
<th>Who delivered?</th>
<th>Two physical therapists with at least 5 years of orthopedic practice for patients with stroke and who had been qualified for at least 10 years.</th>
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</table>

<table>
<thead>
<tr>
<th>How often?</th>
<th>40-minute sessions, 5x/week</th>
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</table>

<table>
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<tr>
<th>For how long?</th>
<th>4 weeks</th>
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</table>

**Group 2: Experimental - Bobath approach**

| Brief description of the intervention | Also known as neurodevelopmental treatment.  
|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| Provided constantly adapting, personalized treatment to promote functional activities.  
| Sensory, proprioceptive, verbal, and visual feedback; hand-over-hand assistance; and key point control was used to retrain patients’ normal alignment and movement patterns.  
| Regulation of muscle tone and instruction on trunk control and postural reactions were taught to enhance balance and movement.  
| The specific approach is provided in an external citation in this study. |

| How many participants in the group? | Bobath approach with spasticity, $n = 10$  
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Bobath approach with relative recovery, $n = 11$</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Where did the intervention take place?</th>
<th>NR</th>
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</table>

<table>
<thead>
<tr>
<th>Who delivered?</th>
<th>Two physical therapists with at least 5 years of Bobath practice on patients with stroke, who had been qualified for at least 10 years. The therapists had also attended the Bobath class for adult hemiplegia.</th>
</tr>
</thead>
<tbody>
<tr>
<td>How often?</td>
<td>40-minute sessions, 5x/week</td>
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<tr>
<td>-----------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>For how long?</td>
<td>4 weeks</td>
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</tbody>
</table>

**Intervention Biases:** *Check yes, no, or NR and explain, if needed.*

**Contamination:**

<table>
<thead>
<tr>
<th>YES  ☐</th>
<th>NO  ☐</th>
<th>NR  ☒</th>
</tr>
</thead>
</table>
| **Comment:** The study decreased the risk for contamination by employing separate therapists to administer the Bobath and orthopedic interventions, which prevented the therapists from mistaking which intervention to administer to each subject. However, the study’s lack of explanation about where the interventions took place puts the study at a risk for contamination, as a subject may have mistakenly entered the incorrect treatment room and be contaminated with the wrong intervention.

**Co-intervention:**

<table>
<thead>
<tr>
<th>YES  ☐</th>
<th>NO  ☐</th>
<th>NR  ☒</th>
</tr>
</thead>
</table>
| **Comment:** The study did not describe any initiative taken to control or measure the effect of additional interventions or medications the subjects may have been receiving during the time of the study, indicating a risk for co-intervention bias.

**Timing:**

<table>
<thead>
<tr>
<th>YES  ☒</th>
<th>NO  ☐</th>
<th>NR  ☐</th>
</tr>
</thead>
</table>
| **Comment:** The study acknowledges that spontaneous recovery along with the specific treatments led to decreased impairment and increased functional levels. Also, the limited treatment period may have not allowed for noticeable effects for all groups. The authors acknowledge that the short treatment period may not have been ideal.

**Site:**

<table>
<thead>
<tr>
<th>YES  ☐</th>
<th>NO  ☐</th>
<th>NR  ☒</th>
</tr>
</thead>
</table>
| **Comment:** The sites of interventions were not described in the study, therefore it cannot be assumed whether the study controlled for a bias caused by location of intervention.

**Use of different therapists to provide intervention:**

<table>
<thead>
<tr>
<th>YES  ☒</th>
<th>NO  ☐</th>
<th>NR  ☐</th>
</tr>
</thead>
</table>
| **Comment:** The study is at risk for bias due to using different therapists, as each intervention group received therapy from more than one therapist. Thus, it is possible that the differing techniques between the therapists affected the outcome measures.

**MEASURES AND OUTCOMES**

Complete for each measure relevant to occupational therapy:

**Measure 1:**

<p>| Name/type of measure used: | Stroke Impairment Assessment Set (SIAS) |</p>
<table>
<thead>
<tr>
<th>Measure</th>
<th>Name/type of measure used</th>
<th>What outcome was measured</th>
<th>Is the measure reliable?</th>
<th>Is the measure valid?</th>
<th>When is the measure used?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 1:</td>
<td>Lower extremity motor control was rated from zero (severely impaired) to five (normal) motor function.</td>
<td>YES ☐ NO ☐ NR ☒</td>
<td>YES ☐ NO ☐ NR ☒</td>
<td>YES ☐ NO ☐ NR ☒</td>
<td>Once before and once after treatment</td>
</tr>
<tr>
<td>Measure 2:</td>
<td>Stroke Impairment Assessment Set (SIAS)</td>
<td>Muscle tone by evaluating lower extremity deep tendon reflexes and passive joint resistance. Deep tendon reflexes were scored on a scale from 0 (markedly increased reflexes) to 3 (normal reflexes). Passive joint resistance was scored on a scale from 0 (remarkably increased resistance) to 3 (normal resistance).</td>
<td>YES ☐ NO ☐ NR ☒</td>
<td>YES ☐ NO ☐ NR ☒</td>
<td>Once before and after treatment</td>
</tr>
<tr>
<td>Measure 3:</td>
<td>Berg Balance Scale (BBS)</td>
<td>Balance during 14 different tasks that were rated on a performance scale from 0 (cannot perform) to 4 (normal performance).</td>
<td>YES ☒ NO ☐ NR ☐</td>
<td>YES ☒ NO ☐ NR ☐</td>
<td>Authors provide a reference for the report of excellent reliability and provide a statistical determination of 0.96 for reliability of this measure.</td>
</tr>
<tr>
<td>Measure 4:</td>
<td>Motor Assessment Scale (MAS)</td>
<td>Authors report relatively good concurrent validity and provide a reference. The BBS also relates well with other clinical balance scales as well as tests used to measure ambulation speed for subjects with hemiparesis.</td>
<td>YES ☒ NO ☐ NR ☐</td>
<td>YES ☒ NO ☐ NR ☐</td>
<td>Once before and once after treatment</td>
</tr>
<tr>
<td>What outcome was measured?</td>
<td>Motor function on a clinical scale of 0 to 6. This study included the five categories of functional mobility scales (rolling, sitting up, balanced sitting, sit to stand, and walking).</td>
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<tr>
<td>Is the measure reliable?</td>
<td>Authors report that the scale is highly reliable and provide a reference. YES ☒ NO ☐ NR ☐</td>
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<tr>
<td>Is the measure valid?</td>
<td>YES ☐ NO ☐ NR ☒</td>
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<tr>
<td>When is the measure used?</td>
<td>Once before and once after treatment</td>
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</table>

**Measure 5:**

<table>
<thead>
<tr>
<th>Name/type of measure used:</th>
<th>Stroke Impact Scale (SIS)</th>
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</thead>
<tbody>
<tr>
<td>What outcome was measured?</td>
<td>Stroke-specific outcome using a subjective questionnaire. A self-assessment scale was provided for subjects to complete based on their performance of 10 functional activities. Scale ranged from a score of 1 (cannot do at all) to 5 (not difficult at all).</td>
</tr>
<tr>
<td>Is the measure reliable?</td>
<td>YES ☐ NO ☐ NR ☒</td>
</tr>
<tr>
<td>Is the measure valid?</td>
<td>YES ☐ NO ☐ NR ☒</td>
</tr>
<tr>
<td>When is the measure used?</td>
<td>Once before and once after treatment</td>
</tr>
</tbody>
</table>

**Measurement Biases**

Were the evaluators blind to treatment status? Check yes, no, or NR, and if no, explain.

| YES ☒ NO ☐ NR ☐ | *Comment:* The study controlled for evaluator bias by having a separate physical therapist who was unaware of the subjects’ group and treatment evaluate the outcome measurement results. |

Recall or memory bias. Check yes, no, or NR, and if yes, explain.

| YES ☐ NO ☐ NR ☒ | *Comment:* The SIS uses a self-assessment scale to evaluate ability to perform functional activities. This measurement provides risk for recall or memory bias because the subjects may recall and report on one instance in which they were able to perform the activity, even if they cannot complete the activity successfully or independently the majority of the time. |

Others (list and explain):

The authors describe that a limitation to the study may be the majority usage of ordinal scales to measure variables, because ordinal scales lack detailed discrimination and objectivity. Further, studies of this type are challenged in measuring and observing all possible variables that influence changes in stroke symptoms in one study.
RESULTS
List key findings based on study objectives
Include statistical significance where appropriate \((p < 0.05)\)
Include effect size if reported

With a level of probability of 0.05, a paired \(t\)-test was used to measure within-group comparisons and an independent \(t\)-test was used to measure between-group comparisons. All subjects with spasticity and hemiparesis in both the orthopedic and Bobath groups demonstrated significant improvements in SIAS motor control of lower extremities \((p < 0.01)\), MAS \((p < 0.001)\), and BBS \((p < 0\) or equal to 0.001). Thus, it can be suggested that orthopedic and Bobath interventions are effective in improving lower extremity motor control, motor function, and balance for individuals with spasticity and hemiparesis secondary to stroke. However, Bobath subjects in the spasticity group displayed more improvements in SIAS \((p = .0.005)\) and SIS \((p = 0.005)\) than the orthopedic group. When comparing the two groups with spasticity, the Bobath treatment group revealed further significant improvement for tone control \((p = 0.006)\), MAS \((p = 0.011)\), and SIS \((p = 0.023)\) compared to the subjects with spasticity who received the orthopedic treatment, suggesting that Bobath therapy can result in better tone control and improved subjective stroke impact ratings. There was no significant difference presented between the spasticity groups receiving either orthopedic or Bobath treatment for balance (BBS) or motor control of lower extremity (SIAS).

For subjects with relative recovery, both Bobath and orthopedic groups showed significant improvements in balance (BBS) \((p \leq 0.001)\) and subjective stroke impact ratings on SIS \((p < 0.01)\). However, the Bobath treatment group with relative recovery displayed added improvements in MAS \((p = 0.001)\), suggesting greater results on motor function using the Bobath approach. Neither the orthopedic or Bobath groups with relative recovery demonstrated significance in measurements of lower extremity motor control or tone on the SIAS, indicating that neither approach suggested greater effectiveness when addressing motor control and tone for patients with relative recovery. When comparing the Bobath group to the orthopedic group with relative recovery, the Bobath treatment group demonstrated further significant improvement on motor function \((MAS, p = 0.007)\), balance \((BBS, p = 0.015)\), and subjective stroke impact ratings \((SIS, p = 0.006)\). Also, when comparing between the two groups of relative recovery, there was no significant difference noted for lower extremity motor control and tone on the SIAS.

Overall, these results provide evidence that the Bobath approach resulted in more significant improvements in motor functions and subjective stroke impact ratings than the orthopedic approach. The results also reveal that the Bobath approach provided more improvement in tone control for patients with spasticity but little improvement in tone for subjects with relative recovery, indicating a possible problem with the Bobath’s approach on regulating muscle tone.
Was this study adequately powered (large enough to show a difference)? Check yes, no, or NR, and if no, explain.

<table>
<thead>
<tr>
<th>YES ☐</th>
<th>NO ☐</th>
<th>NR ✗</th>
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</table>

Comment: Statistical significance was discovered between groups, suggesting that the sample size was large enough to show a difference.

Were appropriate analytic methods used? Check yes, no, or NR, and if no, explain.

<table>
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<tr>
<th>YES ☐</th>
<th>NO ☐</th>
<th>NR ✗</th>
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</thead>
</table>

Comment: The authors do not justify or explain their use of t-tests for analysis. An analysis of variance (ANOVA) may have been more appropriate for this study because the study aimed to compare a variety of outcome measures and several variables.

Were statistics appropriately reported (in written or table format)? Check yes or no, and if no, explain.

<table>
<thead>
<tr>
<th>YES ✗</th>
<th>NO ☐</th>
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</thead>
</table>

Comment: The authors provided two tables with clear organization of the within-group and between-group results.

Was the percent/number of subjects/participants who dropped out of the study reported?

| YES ✗ | NO ☐ |

Limitations:

What are the overall study limitations?

- Possible co-intervention, as subjects may have been receiving additional interventions and or medications
- Possible timing bias due to the effect of spontaneous recovery and limited treatment period
- Possible bias due to the use of two therapists to provide interventions and differing techniques of therapists
- Possible recall or memory bias caused by the use a of subjective self-assessment scale
- Use of ordinal scales in outcome measures
- Lack of the most appropriate analytic methods
- Lack of detailed description of interventions provided

CONCLUSIONS

State the authors’ conclusions related to the research objectives.

The study results provide rationale to show that both Bobath and orthopedic approaches, along with spontaneous recovery, can produce decreases in impairment and increase functioning for patients with acute stroke at hypertonic or relative recovery stages. For patients in both the spasticity and relative recovery groups, the Bobath approach revealed more effectiveness in improving motor function scores, as measured by the MAS, and subjective stroke impact.
ratings, as measured by the SIS. The Bobath approach also demonstrated improvement in tone control for patients with spasticity. The effect of spontaneous recovery and study biases make it difficult to determine whether the interventions alone produced the results. The authors admit that the results described in their study are not generalizable to patients with chronic stroke symptoms.

This work is based on the evidence-based literature review completed by Maggie C. McCabe and Kelly Erickson, PhD, OTR/L, Faculty Advisor, College of Saint Scholastica.


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