Comparison of Motor Relearning Program versus Bobath Approach for Prevention of Poststroke Apathy: A Randomized Controlled Trial

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Background: Apathy is a multidimensional syndrome referring to a primary lack of motivation, frequent in survivors of stroke. And prior studies have demonstrated the negative effect of apathy on recovery from stroke. *Methods*: A randomized controlled study of acute stroke patients. Four hundred and eighty-eight patients without evidence of apathy or depression at the initial visit were consecutively recruited, 258 males and 230 female. Patients were block randomized into 2 groups. Group A (n = 245) and Group B (n = 243) had physiotherapy according to Motor Relearning Program and Bobath in the first 4 weeks, respectively. The supplemental treatment did not differ in the 2 groups. Patients were assessed with Apathy Evaluation Scale-Clinical, National Institutes of Health Stroke Scale scores, Barthel Index scores, Mini-Mental State Examination scores, Hamilton Depression Scale scores, and Hamilton Anxiety Scale scores upon admission. At 1-, 3-, 6-, 9-, and 12-month follow-up after stroke, patients were assessed for diagnosis and severity of apathy using the Apathy Evaluation Scale-Clinical. *Results*: Baseline characteristics of the subjects are age mean 65.1 (standard deviations, SD 10.9); 47.1% female; Apathy Evaluation Scale-Clinical mean 24.9 (SD 4.7); National Institutes of Health Stroke Scale mean 3.9 (SD 3.8); Barthel Index mean 87.9 (SD 8.7); Mini-Mental State Examination mean 23.3 (SD 4.5); Hamilton Depression Scale mean 17.5 (SD 6.6); and Hamilton Anxiety Scale mean 14.4 (SD 6.2). Participants in both groups had similar levels of apathy symptoms at study admission (Motor Relearning Program, mean = 24.78, SD = 4.62; Bobath, mean = 25.07, SD = 4.75). The Apathy Evaluation Scale scores of participants in both groups demonstrated to decline gradually from month 1 to month 12. Motor Learning Program participants had significantly less apathy severity compared with Bobath participants with respect to each time point. Participants given Bobath approach were 1.629 times more likely to develop poststroke apathy than patients given Motor Relearning Program over 12 months. *Conclusions*: Physiotherapy treatment in acute stroke rehabilitation using Motor Relearning program was significantly more effective in preventing of new onset of apathy following stroke compared with Bobath approach.

Introduction

Apathy is increasingly being recognized as a multidimensional syndrome referring to a disturbance of motivation evidenced by diminished goal-directed overt behavior, diminished goal-directed cognition, and diminished emotional concomitants of goal-directed behavior.[1] Apathy occurs in a variety of neurological disorders including stroke, Parkinson disease, trauma, and Alzheimer disease,[2] which overlaps with other psychological and behavioral aspects such as depression, personality, and cognitive functioning.[3] Considering all etiologies, a recent meta-analysis of 24 studies found that apathy occurs in 29.5%-40.2 % of patients after stroke.[4]

Poststroke apathy can have a negative impact on functional recovery, activities of daily living, general health, and quality of life.[5] It can also lead to significant burden for caregivers.[2] Besides, poststroke apathy has been associated with poststroke cognitive impairment, and specifically with executive functioning impairment.[6] We therefore speculated that the prevention of poststroke apathy might significantly improve physical, emotional, and cognitive recovery.

Depression is a common neuropsychiatric consequence of stroke, one that has been reported to negatively affect functional and cognitive recovery.[7] Some patients with poststroke depression develop apathy; however, apathy should probably be regarded as different from depression.[7] For example, it has been found that in patients with a stroke, crying and sadness were associated with a subjective feeling of depression whereas apathy was not.[8] The situation may be more complex, however, as a relationship between depression and apathy could develop over time. A recent study found that 3 months after a stroke, there was no significant overlap between apathy and depression, but 1 year later there was a significant overlap.[9] Thus, to avoid the impact on the results of the study, we excluded depressed patients at baseline.

There is a substantial amount of literature on nonpharmacologic and pharmacologic interventions to the treatment of behavioral problems in patients with neurologic and psychiatric disorders. However, the treatment of apathy has received little direct empirical investigation, with any given treatment being the subject of only 1 or a handful of studies. Though there are currently no proven treatments for poststroke apathy, early prevention of poststroke apathy is of great significance. Previous studies have demonstrated that the severity of impairment in executive functioning was the strongest single predictor for poststroke apathy,[10,11] leading to a thought that stroke rehabilitation could prevent poststroke apathy by minimizing the functional impairments and enhancing the participation of Activities of Daily Living. Early intervention in acute stroke physical rehabilitation plays major role in restoration of function and reducing the degree of disability and dependence for activities of daily living and ambulation.[12] The rehabilitation program in early stages of Parkinson's disease showed an improvement of some symptoms of apathy.[13] Physiotherapy in poststroke rehabilitation has been considered an effective therapeutic measure for poststroke depression, and its effect is prominent, especially in the first 3 months after a stroke.[14,15] But the effectiveness of physiotherapy in poststroke rehabilitation in preventing the incidence of poststroke apathy is unknown.

Physiotherapy in the rehabilitation of stroke patients is represented by various approaches, e.g., Proprioceptive Neuromuscular Facilitation, Brunnstrùm, Bobath, and the Motor Relearning Program.[16] The Motor Relearning Program was developed based on motor learning theory. These treatments were selected because they are well established for use in patients with stroke and have been shown to enhance physical[17] and cognitive[18] recovery from stroke and have been shown to be able to prevent poststroke depression.[14,15] Many previous studies reported that physiotherapy treatment using Motor Relearning Program was more effective than Bobath approach in early enhancement of activities of daily living and ambulation in acute stroke rehabilitation.[19,20] Motor Relearning Program emphasizes the patients to do their best to actively participate in training activities instead of passively waiting for recovery. In order to be involved in this rehabilitation program and to benefit from it, the patients must learn. However, it is well known that nothing can be learned without motivation. And the apathy spectrum includes reduced initiative, interest, motivation, spontaneity, affection, energy, enthusiasm, emotion, and persistence as well as blunted affect.[21] In previous studies, the Bobath concept was the "control group" in all but one of the intervention studies.[22] Therefore, the underlying assumption in Bobath is considered "standard care."[22] Out of these, we have considered Bobath approach and Motor Relearning Program in this study. Since poststroke apathy has been specifically associated with executive functioning impairment,[10,11] we hypothesized that, over a 12-month follow-up, Motor Relearning Program would show better than Bobath approach in prevention the onset of poststroke apathy after treatment of the first 4 weeks.

Methods

The research protocol was accepted by our local ethics committee and by the data inspectorate. Written informed

consent was obtained from all patients after a complete description of all procedures of the study provided.

Participants

Between September 2013 and August 2016, 543 patients with ischemic stroke who were consecutively admitted to the stroke unit of the Department of Neurology at Ji'an Central People's Hospital in China were recruited. Four hundreds and eighty-eight patients with ischemic stroke were randomized to treatment in the study (Fig 1). And written informed consent was obtained from each participant. The inclusion criteria were as follows: (1) first-ever stroke with computed tomography or magnetic resonance imaging scan upon admission and confirmed acute cerebral infarction within 7 days after stroke onset; (2) ≥18 years of age; (3) stable temperature, pulse, respiration and blood pressure; and (4) signed informed consent.

Exclusion criteria were the following: (1) inability to complete the scale evaluation due to communication or cognitive disorders; (2) concurrent diagnosis of terminal illness or Parkinson's disease, all of which have been shown to cause apathy; (3) administered thrombolysis therapy; (4) apathy diagnosis before the stroke; (5) those with a history of schizophrenia, depression, anxiety or other mental illness; (6) inability to give informed consent. Eligible participants were randomized to the 2 intervention groups (Motor Relearning Program, and Bobath approach), developed and maintained by the research secretary. Recruitment staff, therapists, and raters did not have access to the randomization scheme.

Study Design and Assessment of Apathy

The study recruited patients at 6 times.

1. The time at baseline.
2. One month after stroke.
3. Three months after stroke.
4. Six months after stroke.
5. Nine months after stroke.
6. Twelve months after stroke.

To be eligible for the trial, the patients had to be identified as having poststroke apathy at the recruitment point (baseline or 1, 3, 6, 9, or 12 months later). Patients seen at each time point were invited to complete the 18-item clinically rated version of the Apathy Evaluation Scale (AES-C/Clinical-Rated Apathy).[23] The AES-C was developed by Marin et al. and its reliability has been shown to be satisfactory.[23] The Chinese version was validated in an older adult population with a Cronbach alpha coefficient of .90, and test−retest reliability and inter-rater reliability of .88 and .86, respectively.[24] AES-C covers the 4 domains of apathy, including cognitive (AES-Cognitive score), behavior (AES-Behavior score), emotional (AES-Emotional score), and "other." The cognitive domain refers to a reduction in the expression of the number of intentions toward goal-directed behaviors. The behavioral domain is a reduction in the number of observable goal-directed behaviors. The emotional domain assesses a reduction in the number of displays of emotion. Answers are based on a 4-point scale (from 1 = not at all true to 4 = very true) with the minimum score being 18 and the maximum score being 72. The AES-C scores of greater than or equal to 37 were considered to indicate a final diagnosis of postischemic stroke apathy by a professional clinician, with higher scores indicating more apathy.[23] Patients who were not apathy at that follow-up were then seen at the next follow-up time.

Collection of Clinical Data

Age, education, gender, marital status, working status, and whether the person was living with a family member (as a proxy for social support) were recorded. Sleep information was dichotomized at 12 hours per day. Vascular risk factors (i.e., hypertension, diabetes mellitus, coronary artery disease, and smoking) and alcohol use were recorded at the time of admission. Based on the World Health Organization and the International Society of Hypertension guidelines,[25] hypertension was defined as systolic blood pressure higher than or equal to 140 mm Hg or diastolic blood pressure higher than or equal to 90 mm Hg. Stroke severity and the level of disability were assessed using the National Institutes of Health Stroke Scale.[26] The National Institutes of Health Stroke Scale contains 15 examination items and 51 raw score choices. The total score is equal to the sum of the 15 parameters. For all of the parameters, a value of 0 is normal.[26] Functional ability in Activities of Daily Living was measured by the observer-rated Barthel Index,[27] with the total ranging from 0 (total dependence) to 100 (independence on all 10 items). The Mini-Mental State Examination was used to determine global cognitive functioning.[28] Symptoms of depression and anxiety were screened with the Hamilton Depression Scale scores and Hamilton Anxiety Scale scores. These scales were widely used and have been validated in the Chinese populations.[29] These measures were examined within the first 24 hours after admission.

Intervention

The eligible patients were randomly divided into 2 groups. Group A received Motor Relearning Program[16] and Group B received Bobath approach.[30] Randomization into 1 of the 2 intervention groups was undertaken by an independent researcher (the secretary of the ward) using computer-generated random number sequences that were prepared in advance and placed in consecutively numbered, sealed, opaque envelopes. Information concerning the physiotherapy used was known only by the therapists who treated the patients and the secretary of the ward, who was in charge of the randomization. The researcher who
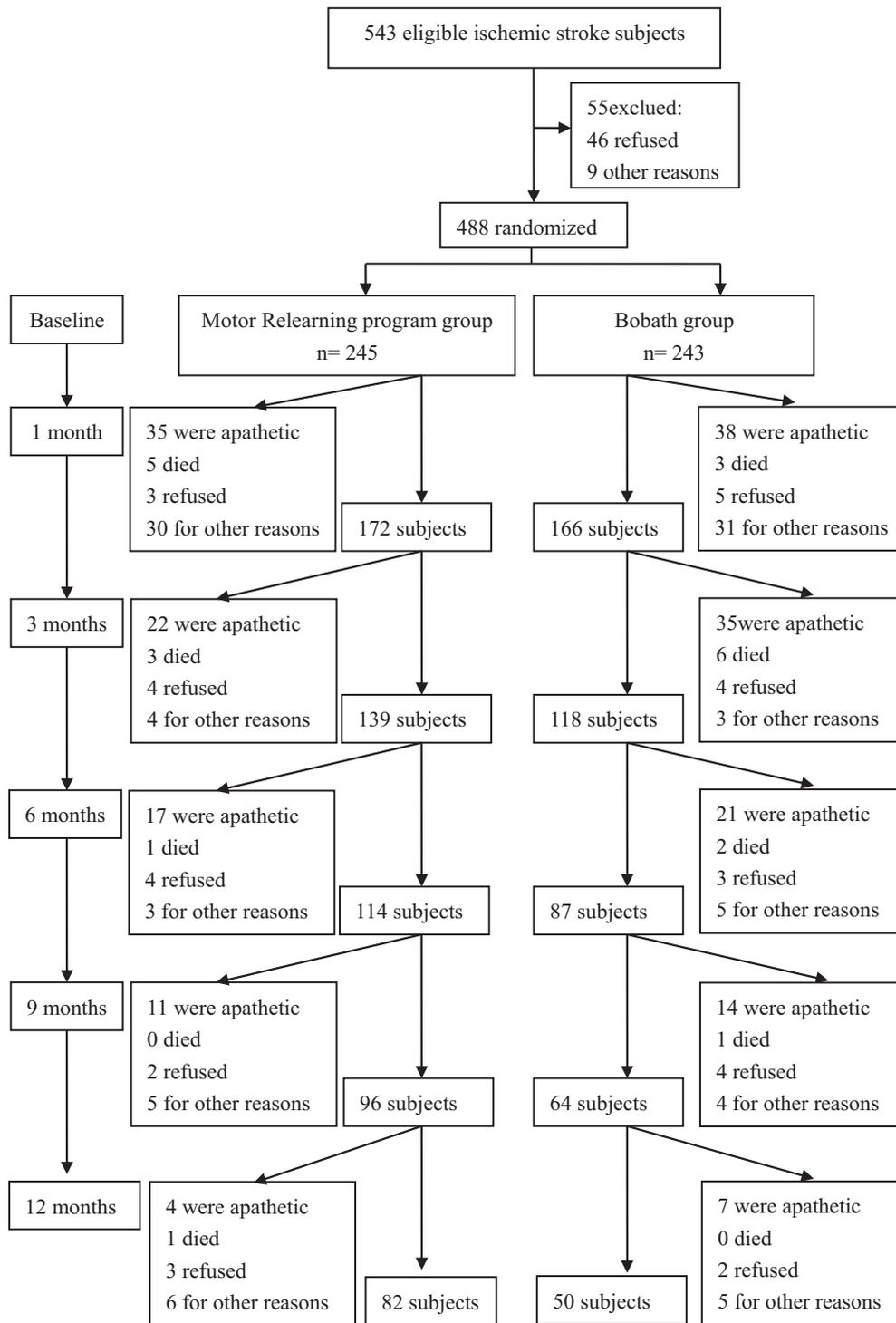
543 eligible ischemic stroke subjects

55exclued:
46 refused
9 other reasons

488 randomized

Baseline

Motor Relearning program group
n= 245

Bobath group
n= 243

1 month

35 were apathetic
5 died
3 refused
30 for other reasons

172 subjects

166 subjects

38 were apathetic
3 died
5 refused
31 for other reasons

3 months

22 were apathetic
3 died
4 refused
4 for other reasons

139 subjects

118 subjects

35were apathetic
6 died
4 refused
3 for other reasons

6 months

17 were apathetic
1 died
4 refused
3 for other reasons

114 subjects

87 subjects

21 were apathetic
2 died
3 refused
5 for other reasons

9 months

11 were apathetic
0 died
2 refused
5 for other reasons

96 subjects

64 subjects

14 were apathetic
1 died
4 refused
4 for other reasons

12 months

4 were apathetic
1 died
3 refused
6 for other reasons

82 subjects

50 subjects

7 were apathetic
0 died
2 refused
5 for other reasons

Figure 1. *Flow chart of study population of the subjects from baseline to 12 months.*

collected data did not know which group the patients were in. The 2 physiotherapy programs were standardized as follows; a manual describing the main philosophy behind the 2 physiotherapy methods was produced according to background literature.[31] These treatments were discussed among the physiotherapists and the project leader in order to coordinate and as far as possible identify treatment variables in a "Bobath respectively Motor Relearning Program manner" and as described in the manuals true to the background literature. The patients included in the study were given physiotherapy 5 days weekly with a minimum of 40 minutes duration for a period of 4 weeks. Besides physiotherapy, the patients received the same comprehensive, multidisciplinary treatment for stroke patients.

Statistical Analysis

The Statistical Package for the Social Sciences version 17 for Windows was used for all statistical analyses. Independent samples t tests or analyses of covariance were employed for between group comparisons on continuous variables. Univariate analyses of the association between categorical variables in both groups were performed using χ^2 tests. Descriptive data are presented as mean and standard deviations (SD) or as 95% confidence intervals and percentages.

In order to analyze the time to the onset of poststroke apathy, a proportional hazards Cox regression model was used. Various baseline characteristics, such as age, were considered as possible confounders. Two-way interactions between covariates and treatment group were considered. This analysis included patients who completed the study as well as those who dropped out after randomization. Patients who dropped out after randomization were considered in the model as censored observation at the time they stopped participating in the study. For all analyses, probability levels reported were 2-tailed and the level of significance was set at $P < .05$.

Results

The patient flow diagram is shown in Figure 1. In total, 245 and 243 subjects were randomly allocated to Groups A and B, respectively. Among these patients, 463 were recruited into the trial at 1 month, 332 were recruited at 3 months, 251 were recruited at 6 months, 194 were recruited at 9 months, and 151 were recruited at 12 months. Baseline characteristics of the subjects are age mean 65.1 (SD 10.9); 47.1% female; AES-C mean 24.9 (SD 4.7); National Institutes of Health Stroke Scale mean 3.9 (SD 3.8); Barthel Index mean 87.9 (SD 8.7); Mini-Mental State Examination mean 23.3 (SD 4.5); Hamilton Depression Scale mean 17.5 (SD 6.6); and Hamilton Anxiety Scale mean 14.4 (SD 6.2). There were no significant differences in demographic or baseline variables among the 2 treatment groups or between those who dropped out and those who completed the study (Table 1). Raw means for apathy symptoms by group over time are presented in Figure 2. The AES-C scores of participants in both groups demonstrated to decline gradually from month 1 to month 12, except that the worse scores on measures of apathy in Bobath group at month 3 than month 1.

Table 1. *Characteristics of poststroke patients randomized to receive Motor Relearning Program (MRP) or Bobath approach*

	MRP group (n = 245)	Bobath group (n = 243)	Statistics	P value
Age, years*	65.69 ± 7.97	65.53 ± 7.20	t = .218	.828
Gender, male/female[†]	130/115	128/115	χ^2 = .007	.932
Marital status, single/married/divorced or separated/widowed[†]	6/180/20/39	7/178/25/33	χ^2 = 1.133	.769
Working status, working/not working/unknown[†]	97/135/13	99/127/17	χ^2 = .788	.674
Education, years*	7.78 ± 2.62	7.39 ± 2.76	t = 1.507	.133
Living status, living alone/living with others/unknown[†]	51/183/11	39/192/12	χ^2 = 1.848	.397
Smoking(yes/no)[†]	111/134	103/140	χ^2 = .422	.516
Drinking(yes/no[†])	142/103	144/99	χ^2 = .085	.771
Hours of sleep(yes/no)[†,‡]	104/141	101/142	χ^2 = .039	.843
BMI*	19.44 ± 2.39	19.84 ± 2.55	t= −1.670	.096
HT(yes/no)[†]	147/98	138/105	χ^2 = .517	.472
DM(yes/no)[†]	28/217	30/213	χ^2 = .098	.754
CHD(yes/no)[†]	39/206	31/212	χ^2 = .992	.319
SBP, mmHg*	141.06 ± 21.00	139.14 ± 20.41	t= .966	.335
DBP, mmHg*	83.70 ± 12.70	84.75 ± 11.03	t= −.921	.357
AES-C score*	24.78 ± 4.62	25.07 ± 4.75	t= −.641	.522
HAMD score*	17.90 ± 6.39	17.16 ± 6.85	t= 1.170	.243
HAMA score*	14.79 ± 6.25	13.98 ± 6.14	t= 1.372	.171
NIHSS score*	3.61 ± 3.16	4.19 ± 4.35	t= −1.610	.109
MMSE score*	23.49 ± 4.39	23.11 ± 4.54	t= .888	.375
BI score*	87.66 ± 9.12	88.19 ± 8.25	t= −.642	.521

Abbreviations: AES-C, Apathy Evaluation Scale-Clinical; BI, Barthel Index; BMI, body mass index; CHD, coronary heart disease; DBP, diastolic blood pressure; DM, diabetes mellitus; HAMA, Hamilton Anxiety Scale; HAMD, Hamilton Depression Scale; HT, hypertension; MMSE, Mini-Mental State Examination; MRP, Motor Relearning Program; n, total number; NIHSS, National Institutes of Health Stroke Scale; SBP, systolic blood pressure (0-95 = severe to mild disability, 100 = no disability).

*Assessed by independent-samples t test.

[†]Assessed by χ^2 test.

[‡]Hours of sleep was dichotomized at 12 hours per day. Significant findings ($P < .05$) are indicated in bold. There were no baseline differences between the patients in the Bobath and the Motor Relearning Program group.
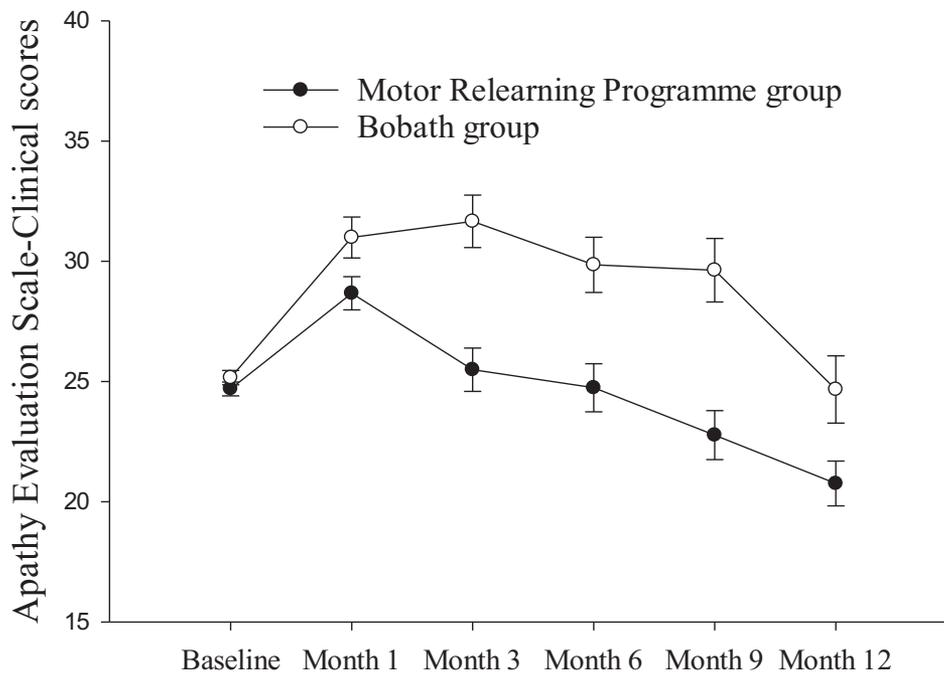
Figure 2. *Apathy Evaluation Scale-Clinical scores, unadjusted means, by different time point.*

Moreover, there were statistically significant differences between the 2 groups with respect to each time point. Motor Learning Program participants had significantly less apathy severity compared with Bobath participants from month 1 to month 12.

The time from enrollment to onset of apathy was 3.93 ± 3.26 SD months for Motor Learning Program, and 4.17 ± 3.32 SD months for Bobath. The times were not significantly different (t = −.500, P = .617). To examine the preventive effect of Motor Learning Program or Bobath on time from beginning treatment to new apathy onset as the dependent variable, we built a Cox proportional hazards model using the 488 patients. Based on our previous study,[32] poststroke apathy has been associated with age, level of education, hours of sleep, body mass index, Hamilton Depression Scale score, Hamilton Anxiety Scale score, National Institutes of Health Stroke Scale score, Mini-Mental State Examination score, Barthel Index score, and AES-C score at baseline. So, these variables were included in the model as covariates. After adjusting for covaria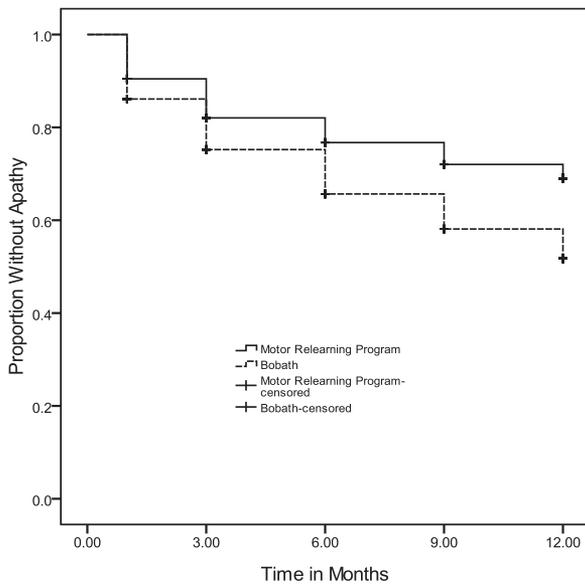tes, participants receiving Bobath (83 cases of poststroke apathy; total: 38.4%) were 1.629 times more likely to develop poststroke apathy than patients receiving Motor Relearning Program (57 cases of poststroke apathy; total: 25.9%; Table 2; Fig 3).

Among patients with apathy, there were 31 patients who also developed comorbid depression. Therefore, as a subgroup analysis, we excluded patients with comorbid depression and conducted a Cox proportional hazards model to examine time to onset of apathy alone. There were 109 patients with apathy without depression; 64 received Bobath, 45 received Motor Relearning Program. After adjusting for age, level of education, hours of sleep, body mass index, Hamilton Depression Scale score, Hamilton Anxiety Scale score, National Institutes of Health Stroke Scale score, Mini-Mental State Examination score, Barthel Index score, and AES-C score at baseline, similar to our prior finding, participants who received Bobath were 1.653 times more likely to develop apathy than patients who received Motor Relearning Program (adjusted hazard ratio: 1.653, 95% confidence interval: 1.129-2.421; P = .010).

Table 2. *The Cox hazard ratio (HR) model results for risk comparison of poststroke apathy onset*

	Adjusted hazard ratio (HR)	95% confidence interval (CI) for hazard ratio (HR)	*P* value
Bobath versus MRP	1.629	1.161-2.283	.005
BI	.981	.964-.999	.036

Abbreviations: BI, Barthel Index; MRP, Motor Relearning Program.

Figure 3. *Kaplan−Meier plot of poststroke apathy (PSA) onset for patients receiving Motor Relearning Program (MRP) or Bobath concept over 1 year.*

After adjusting for age, level of education, hours of sleep, BMI, HAMD score, HAMA score, NIHSS score, MMSE score, BI score, and AES-C score, participants who received Bobath were 1.629 times more likely to develop PSA than patients who received MRP (adjusted hazard ratio [HR]: 1.629; 95% confidence interval [CI]: 1.161-2.283; *P* = .005). Abbreviations: AES-C, Apathy Evaluation Scale-Clinical; BI, Barthel Index; BMI, body mass index; HAMA, Hamilton Anxiety Scale; HAMD, Hamilton Depression Scale; MMSE, Mini-Mental State Examination; MRP, Motor Relearning Program; NIHSS, National Institutes of Health Stroke Scale; PSA, Poststroke apathy.

Discussion

Our results showed that Motor Relearning Program group scored significantly better than Bobath group on AES-C. To our knowledge, this is the first study to evaluate the preventive efficacy of rehabilitation programs on poststroke apathy.

There is a substantial amount of literature on psychologic and pharmacologic approaches to the treatment of behavioral problems in patients with neurologic and psychiatric disorders. However, the treatment of apathy has received little direct empirical investigation, with any given treatment being the subject of only 1 or a handful of studies. But apathy is a common problem observed in numerous neurologic, psychiatric, and other medical conditions. At present, agents that potentiate dopamine release and/or delay dopamine reuptake in the central nervous system appear promising for use in apathy.[33,34] Among these, atypical antipsychotics and methylphenidate have received the greatest attention, and both have been demonstrated to reduce apathy in several patient populations.[35] A multicenter, randomized, open-label study revealed a significantly greater reduction in apathy at 1-year follow-up in patients treated with olanzapine (n = 120; mean dosage = 12.2 ± 5.8 mg/day) relative to

those treated with risperidone (n = 115; mean dosage = 4.9 ± 2 mg/day).[36] Amantadine (300 mg/day) was reported to be helpful in reducing apathy in a double-blind, placebo-controlled case study involving a patient with traumatic brain injury.[37] Another class of medication that has been the subject of a larger number of investigations is the acetylcholinesterase inhibitors. These have been reported to reduce apathy in patients with dementia and individuals with traumatic brain injury.[37] Robinson et al.[38] found that poststroke apathy associated with major depression was significantly improved using 900 mg/day of nefiracetam, compared with a lower dose of nefiracetam (600 mg) or placebo. But Starkstein et al. reported that treatment with nefiracetam did not prove to be more efficacious than placebo in ameliorating apathy in stroke.[39] Further studies should assess whether poststroke apathy responds to this treatment. Not surprisingly, therefore, there is currently insufficient evidence to support a pharmacological approach to treat poststroke apathy.

A randomized, controlled clinical trial that investigated the impact of 4 weeks of activity therapy on apathy in 36 patients with dementia, revealed significantly reduced apathy in patients after participation.[40] Studies referring to normal movement in neurological rehabilitation of stroke are mainly focused on normalization of tone and movement and have been a methodological cornerstone in the Bobath method.[41] Few studies have focused on interventions aimed at prevention of poststroke apathy in stroke rehabilitation, despite the frequent clinical symptom after stroke.[32] It is suggested that acute rehabilitation is an optimal setting for clinical trials for poststroke apathy because apathy is associated with poor outcomes and shows only a small degree of spontaneous improvement.[37] Besides, Daniele and Panza reported that a 13-week rehabilitation program may induce beneficial effects up to 18 months after the end of the program, such as an improvement of apathy.[13]

Early intervention in acute stroke rehabilitation plays major role in restoration of function and reducing the degree of disability and dependence for Activities of Daily Living and ambulation.[42] Almost all patients with stroke need rehabilitation therapies. Selection of appropriate and best neuro rehabilitation approach is critical. The historical perspective neuro rehabilitation approaches evolved from reflex theory of motor control and Hierarchical model of motor control.[20] One of the approaches based on this concept is Bobath approach.[30] In Bobath approach, initial phase of rehab concentrated more positioning, handling, and transfer training, learning control of trunk, upper limb, and lower limb. There is training of reactive postural control, protective reaction, and equilibrium without task-specific training. It also concentrated mainly on reduction of spasticity and avoidance of abnormal pattern of movement, which limited the scope of direct training of activity.[22] With development of theories of motor control of system theory of motor control, dynamic theory

of motor control, and biomechanics and new approaches developed. Based on dynamic System theory of motor control concepts, different task-specific training approaches developed such as Motor Relearning Program for Stroke.[43] Motor Relearning Program is based on task-specific training, which involves assessment and training in 7 different task of daily life.[16] The program is composed of guidelines for evaluating and improving 7 daily functions: (1) Upper limb function, (2) Oro-facial function, (3) Sitting up from supine, (4) Sitting, (5) Standing up and sitting down, (6) Standing, (7) Walking. The 4 steps of the Motor Relearning Program followed. (1) Analysis of task: observation, comparison, and analysis. (2) Practice of missing components: explanation—Identification of goal, instruction, practice plus verbal and visual feedback plus manual guidance. (3) Practice of task: explanation—Identification of goal, instruction, practice plus verbal and visual feedback plus manual guidance, progression (increase complexity, add variety, decrease feedback, and guidance), revaluation, encourage flexibility. (4) Transfer of learning: opportunity to practice in context, consistency of practice and positive reinforcement, organization of self-monitored practice, structured and stimulating learning environment, involvement of relatives and staff. The patient must always be actively participating in the activity (without resistance) and given some opportunity to make mistakes.[19] Poststroke apathy is a disturbance of motivation evidenced by low initiative, difficulties in starting, sustaining or finishing any goal-directed activity, low self-activation or self-initiated behavior, and emotional indifference.[6] Therefore, we have considered Bobath approach and Motor Relearning Program in this study. So many articles support the view that physiotherapy treatment using Motor Relearning Program is more effective than Bobath approach in early enhancement of Activities of Daily Living and ambulation in Acute Stroke Rehabilitation.[37,43] Therefore, we did not assess the differences of the National Institutes of Health Stroke Scale and Barthel Index scores between Motor Relearning Program group and Bobath group at 1-, 3-, 6-, 9-, and 12-month follow-up after stroke.

We found that Motor Relearning Program was more effective than Bobath approach in prevention of poststroke apathy. Task-specific training of Motor Relearning Program in initial phase of rehab helped in learning of the motor control and pattern of movement for specific activity and not just learning the non−task-specific movement and motor control of movement.[41] This active participation and self-reliance helped in motor learning of the pattern of movement and reducing the onset of poststroke apathy. One of the reasons may be that apathy is phenomena closely related to motivation, while Motor Relearning Program approach efforts aiming to reduce apathy will promote motivation. But Bobath approach does not emphasize active participation by patients. That may be the reason why Motor Relearning Program was found to

be more effective than Bobath approach in prevention of poststroke apathy. Taken together, although apathy is a frequent and debilitating condition following stroke, there is a paucity of controlled clinical trials on the efficacy of current therapeutic or preventive options. This study presented significant results in favor of a particular physiotherapy regime for preventing of poststroke apathy, and should give inspiration to further, similar controlled clinical studies within physiotherapy. More treatments or preventions should be rigorously tested.

Limitations to the current study include the subjects selected for the study did not include all patients with acute stroke. Depression and apathy do appear to overlap partially and can co-occur, but they can also occur independently after stroke. Therefore, to avoid the impact on the results of the study, we excluded depressed patients. Thus, our findings cannot be generalized to all patients with first-ever stroke. Besides, the study had a relatively small sample size, and the number of incident poststroke apathy cases was also relatively small. Thus, our findings should be considered preliminary, and further studies of prevention of poststroke apathy are needed. Moreover, the design did not foresee an untreated control group. Finally, these 2 physiotherapy treatments could not be blinded.

Clinical Messages

One potential practical implication of these findings for clinicians in long-term care settings is that physiotherapy treatment of training in early phase of rehabilitation using Motor Relearning Program was found to be more effective than Bobath approach in prevention of poststroke apathy when compared at 1 year's follow-up.

Acute rehabilitation setting is ideal for conducting clinical trials for poststroke apathy prevention, because apathy is common, is associated with poor outcomes, and shows only a small degree of spontaneous improvement.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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