Correlation between the Action Research Arm Test and the Box and Block Test of Upper Extremity Function in Stroke Patients

Ratanapat Chanubol MD*, Parit Wongphaet MD**,
Napapit Chavanich OT**, Waree Chira-Adisai MD**,
Patcharawimol Kuptniratsaikul MD**, Chattaya Jitpraphai MD**

** Department of Rehabilitation Medicine, Prasat Neurological Institute, Bangkok, Thailand*
*** Department of Rehabilitation Medicine, Ramathibodhi Hospital, Mahidol University, Bangkok, Thailand*

Objective: *The objective of the present study was to determine the correlation between the scores of the Action Research Arm Test (ARAT) and the Box and Block Test (BBT), commonly used tests of upper extremity (UE) function.*
Material and Method: *Forty first-time subacute stroke patients without severe cognitive, language, or motion impairment were administered the ARAT and BBT before and after participating in a 4-week rehabilitation program. Their scores were analyzed by Wilcoxon sign-rank testing and by Spearman's rank correlation, standardized response mean, and scatter-plot analysis.*
Results: *The ARAT and the BBT scores have a high level of responsiveness to change and are highly correlated. The BBT has a floor effect compared with the ARAT while the ARAT has a small ceiling effect compared with the BBT.*
Conclusion: *The ARAT and the BBT scores have excellent concurrent validity and are highly responsive to change, indicating that the BBT can effectively assess UE function.*

Keywords: *Action research arm test, Box and block test, Stroke, Upper extremity function*

J Med Assoc Thai 2012; 95 (4): 590-7
Full text. e-Journal: *http://www.jmat.mat.or.th*

Among the forms of disability that may result from stroke, a common cause of disability[1], arm function impairment is one of the most significant[2]. Arm function assessment tests are thus important tools in routine clinical assessment as well as research. It is therefore important that these tests have an adequate level of validity, reliability, and sensitivity to change while being as little time consuming to administer and complete as possible. Many arm function assessment tests are currently available, each of which focuses on measuring different aspects of arm function and disability. Several tests, including the Motricity Index (MI) and the Brunnstorm-Fugl-Meyer Assessment (FMA)[3], focus on measuring voluntary motor control on the impairment level, while others, including the Action Research Arm Test (ARAT) and the Box and Block Test (BBT), focusing on measuring the ability to perform certain tasks[4]. The results of these latter two performance-oriented tests, both of which have been found to have a high level of construct validity and interrater and intrarater reliability[5-7], have been found to provide a better indication of a patient's disability than the former two impairment-oriented tests.

The ARAT[4] requires the patient to complete 19 tasks, which encompass the four general performance groups of grasping, gripping, pinching, and gross arm movement, by transporting a specific object (*e.g.*, a cube of a certain size) from a specified starting position to a specified end point. Based on assessment of performance according to predefined performance criteria, the patient receives a score of 0 to 3 for each task. The ARAT is less time consuming to administer and complete than the FMA, and the ARAT score has been found to have a good correlation with the FMA score while being more sensitive to changes in performance[8]. However, administration of the ARAT requires access to and presentation of a number of specific materials, including a shelf, table, wooden

Correspondence to:
Chanubol R, Rehabilitation Department, Prasat Neurological Institute 312 Rachvithi Rd, Phyathai, Bangkok 10400, Thailand.
Phone: 0-2354-7075-87, Fax: 0-2354-7072
E-mail: cpaphan@yahoo.com

cubes, marbles, and metal ball bearings and rings, of specific dimensions.

In contrast, the BBT, a test in which the patient must transport 2.5-cm^3 wooden cubes from one compartment of a box to another, is not only relatively simple to administer but is also less time consuming to complete compared to the ARAT, requiring only one to two minutes[4]. Although the BBT score has been found to have a good correlation with the FMA score[9], which indicates that it has a high level of construct validity, no study to date has examined the correlation between the BBT and ARAT scores or compared their level of sensitivity (responsiveness) to change. The present study attempted to fill this research gap by determining both the correlation between the test scores and their respective responsiveness to change in performance over time.

Material and Method

Participants

Over a 31-month period (between July 2006 and January 2009), 40 subacute stroke patients aged 18 to 79 years receiving treatment at the Prasat Neurological Institute and Ramathibodhi Hospital in Bangkok, Thailand were recruited for study participation. All the participants met the present study inclusion criteria of (1) being a first-time ischemic or hemorrhagic stroke patient, (2) being able to sit with or without any support for at least one hour, (3) being able to understand the purpose of the present study and follow the instructions, (4) demonstrating impaired upper extremity (UE) function, as demonstrated by an ARAT score of less than 57, (5) demonstrating absence of excessive spasticity, as evidenced by a Modified Ashworth Scale score of less than 2.5, and (6) demonstrating absence of joint passive motion limitation. None of the participants met the exclusion criteria of demonstrating (1) unstable cardiovascular condition, as determined by screening with a 12-lead electrocardiogram and examination by a physician, (2) restricted passive range of motion of all UE joints of more than 30°, as determined by testing while lying supine, and (3) presence of other neurological or orthopedic diseases impairing UE function. All participants provided written informed consent for participation in the present study and approval for the study was obtained by the local ethical committee.

Interventions and procedures

All participants received 1 hour of UE training five days a week (Monday to Friday) for four consecutive weeks as part of a 4-week rehabilitation program. Other rehabilitation programs were the same for both groups. An assessor who was blind to the present study purpose assessed the primary and secondary outcome variables of UE function at study onset (pre-treatment function) and after completion of rehabilitation treatment (post-treatment function).

Outcome measures

The primary outcomes measured were the pretreatment and posttreatment ARAT and BBT scores. The ARAT provides a standardized measure of UE (arm and hand) functioning by scoring the performance of 19 movements encompassing the four general UE movements of grasping; griping; pinching; and gross movement of the shoulder, elbow, and fingers. Scoring is based on an ordinal 4-point scale (0-3) according to which a score of "0" is allocated if the participant cannot perform any part of the relevant task, "1" if he/she can only lift the relevant object completely from the platform, "2" if he/she can perform the relevant task fully but does so clumsily or with great difficulty, and "3" if he/she can perform the relevant task fully and normally. The maximum possible score that can be received for performing all the tasks is 57 points. The hierarchical structure of the test implies that receiving a "3" for completing the first task in a subtest predicts success in completing the other tasks in the same subtest. Specifically, a participant who receives a "3" for the first and most difficult task in a subtest receives a "3" for the entire subtest without having to perform any additional tasks. A participant who receives a score of "0" for the first and most difficult task in a subtest will subsequently be presented with the easiest task and, if he/she fails to complete this task, receives a score of "0" for the entire subtest. A participant who receives a score of either "1" or "2" for the first task must complete all tasks within that subtest (see Fig. 1 and the Appendix).

Administration of the BBT, which provides a measure of gross manual dexterity, requires presentation of two adjacently placed boxes, between which is placed a partition 15.2 cm in height. One of the two boxes, both of which are 53.7 x 25.4 x 8.5 cm in size, is filled with 150 wooden blocks, each 2.5 cm^3 in size, while the other is empty. The patient must attempt to transport the maximum number of blocks from one compartment of the full box to the empty box within 60 seconds by grasping each block and transporting it over the partition (see Fig. 2).

Two well-developed secondary outcome measurements are Extended Barthel Index (EBI) and functional ambulation category (FAC).

EBI was used for evaluated the basic activity of daily living and degree of independence which was developed to address perceived limitation of the 'Functional Independence Measure (FIM)' and existing 'Barthel Index' by adding items for comprehension, expression, social interaction, problem solving, memory/learning/orientation and vision/neglect. EBI is more sensitive to change over time than Barthel index, and time required to administer was described as significantly shorter than the time needed to administer the FIM. The score starts from 0 to 64[10].

FAC helped to assess gait ability. Six categories (0-5) were distinguished to give detail on the physical support needed by patients while walking, irrespective of the technical aids used. Level 0 indicates a patient who cannot walk at all or needs help from two therapists. Level 5 indicates a patient who can walk everywhere, including stairs independently[11].

Fig. 1 Set up of action research arm test

Fig. 2 Set up of Box and Block test

Statistical analysis

Using SPSS software program 19.0, the following test and analyses were performed:

1. The one-sample Kolmogorov-Smirnov test was performed to determine the distribution of the demographic data and present the results as descriptive statistics.

2. The Wilcoxon sign-rank test was performed to determine the extent of improvement in UE functioning after treatment.

3. Spearman's rank correlation coefficient (r_s) analysis was performed to determine the level of concurrent validity between the ARAT and BBT scores. A correlation coefficient of less than 0.25 was considered to indicate a low level of correlation, 0.25 to 0.5 to indicate a fair level, 0.5 to 0.75 a moderate to good level, and greater than 0.75 to indicate a good to excellent level[12].

4. The standardized response mean (SRM), a variant of effect size that is calculated by dividing the standard deviation (SD) of the change between pre-treatment and post-treatment scores by the mean change between the scores, was determined as a measure of responsiveness to change over time. According to Cohen's criteria regarding effect size, an SRM of 0.8 or greater is large, 0.5 to 0.8 is moderate, and 0.2 to 0.5 is small[13,14].

Results

The demographic data of the 40 participants are shown in Table 1. As can be observed, 50% of the 20 male and 20 female participants, with a mean age of 61.6 years (SD $\pm$ 10.5 years), had less than a secondary school education. Based on Oxfordshire Community Stroke Project Classification criteria[15], most were classified with lacunar infarction. The participants represented the entire range of stroke severity in terms of neurologic impairment, as assessed by determination of National Institutes of Health Stroke Scale (NIHSS)[16] score, which ranges from 1 to 18, and functional ambulation categories (FAC) score, which ranges from 0 to 5 at admission. They also represented the entire range of disability, as assessed by Extended Barthel Index (EBI) score, which ranges from 25 to 64. The results of Wilcoxon signed-rank testing performed to compare the pre-treatment and post-treatment

Table 1. Demographic data (n = 40)

Characteristic	Result
Age (y), mean ± SD (range)	61.6 ± 10.5 (31-78)
Sex, male/female, n (%)	20/20 (50/50%)
Bamford classification	
Hemorrhage, n (%) (LACH/TACH)	3/2 (7.5/5%)
Infarction, n (%) (LACI/TACI/PACI)	26/5/4 (65/12.5/10%)
Side of weakness, right/left, n (%)	21/19 (52.5/47.5%)
Education	
≤ 6 yrs formal education, n (%)	20 (50%)
> 6 yrs education, n (%)	20 (50%)
NIHSS (score), mean ± SD (range)	9.4 ± 4.1 (1-18)
ARAT score, median (IQR)	
Pretreatment	7 (0-32.25)
Four weeks posttreatment	27 (4.25-45)*
BBT score, median (IQR)	
Pretreatment	0 (0-13.5)
Four weeks posttreatment	8 (0-37)*
EBI score, median (IQR)	
Pretreatment	41.5 (37.5-49)
Four weeks posttreatment	60 (51.5-64)*
FAC score, median (IQR)	
Pretreatment	2 (1-3)
Four weeks posttreatment	4 (4-5)*

* $p < 0.001$ according to results of Wilcoxan signed-rank testing performed to compare each set of pretreatment and posttreatment functional scores
ARAT = action aesearch arm test; BBT = box and block test; EBI = extended Barthel Index; FAC = functional ambulation classification; IQR = interquartile range; LACI = lacunar infarction; PACI = posterior anterior circulation infarction; TACI = total anterior circulation infarction

scores indicated that the participants had experienced a significant improvement in every outcome variable ($p < 0.001$). The results of Spearman rank correlation analysis, which are shown in Table 2, indicate a high level of correlation between the ARAT and BBT scores and between the EBI and FAC scores, both on admission ($r_s = 0.90$ and $r_s = 0.85$, respectively, $p < 0.001$) and on discharge ($r_s = 0.95$ and $r_s = 0.90$, respectively, $p < 0.001$). However, comparison of the scores of the UE functional test of the ARAT and BBT to the independence in activities of daily living battery test of the EBI and to the ambulation ability test of the FAC indicated only fair to moderate correlation at pre-treatment ($r_s = 0.46$-0.56, $p < 0.001$) and moderate to good correlation at post-treatment ($r_s = 0.64$-0.75, $p < 0.001$).

The mean change in ARAT and BBT score from admission to discharge was found to be 13.2 ± 11 and 11.12 ± 11.45, respectively, representing a 91.5% change in the ARAT score and a 14.8% change in the BBT score over the 4-week study period. Sensitivity to change as measured by the SRM was found to be 1.20 for the ARAT score and 0.97 for the BBT score. The change in ARAT score was found to be highly correlated with the change in BBT score ($r_s = 0.87$, $p < 0.001$). Analysis of the scatter plot of the ARAT and BBT scores shown in Fig. 3 revealed that the BBT score was 0 in 30% of all assessments but that the ARAT score was not, whereas the ARAT score was the maximum (57) in 4.5% of all assessments while the BBT score was not. In such a situation, however, the BBT score could still demonstrate difference among the participants.

Table 2. Result of Spearman rank correlation coefficient analysis pretreatment and posttreatment scores

Functional test	Pretreatment			Posttreatment		
	ARAT	BBT	EBI	ARAT	BBT	EBI
ARAT	-	0.90*	0.56*	-	0.95*	0.64*
BBT	0.90*	-	0.47*	0.95*	-	0.71*
EBI	0.56*	0.47*	-	0.64*	0.71*	-
FAC	0.50*	0.46*	0.85*	0.68*	0.75*	0.90*

* Correlation is significant at the p = 0.001 level for all tests
ARAT = action research arm test; BBT = Box and Block test; EBI = extended Barthel Index; FAC = functional ambulation classification

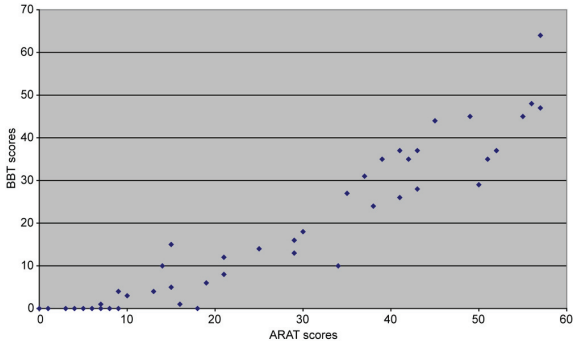

Fig. 3 Scatter plot of action research arm test and Box and Block test scores

Discussion

The ARAT is a criterion test that provides a standardized measure of UE functioning. The results of the present study revealed a high level of correlation ($r_s > 0.8$, $p < 0.001$) between the ARAT and the BBT score. As such, the results indicate that the BBT has a high level of concurrent validity, defined as the degree to which the outcomes of a test correlate with the outcomes of a criterion test[17], and agree with the results of other studies[9,12-14,18]. Because the BBT is less time consuming to administer and complete, it is a preferable means of assessment compared to the ARAT if time is a limiting factor. However, the results also indicate a weaker relationship between the scores of tests of UE dexterity (the ARAT and the BBT) compared with the EBI and the FAC scores, but a strong correlation between the EBI and the FAC scores. These results reflect the fact that the level of independence in activities of daily living is more strongly correlated with walking ability than with UE functioning. This is not surprising because a hemiplegic patient can learn to accomplish most of the activities of daily living with the normal UE regardless of the impairment in the affected arm and hand. Therefore, the UE dexterity tests are needed for arm function assessment and cannot be replaced with ADL assessment tools.

Responsiveness to change, defined as the ability to detect important change over time in the concept being measured, is rated as positive if a measure demonstrates a significant change in response to intervention within the context of an appropriate study design. Given the rapid proliferation of randomized controlled trials in stroke rehabilitation, selecting outcome measures that are responsive, reliable, and valid is crucial. An instrument used as an outcome measure in clinical trials should be able to detect changes with improvement or deterioration and distinguish between effective and ineffective treatments. According to Cohen's criteria regarding effect size, an SRM of 0.8 or greater is an indication of high sensitivity and the ability to detect change over time. As the SRM of the ARAT was found to be 1.20 and that of the BBT to be 0.97, both tests can be considered highly sensitive and responsive to change over time.

Floor and ceiling effects are considered present if more than 20% of participants in a study achieve the lowest or highest possible scores, respectively[19]. Analysis of the results indicates that the BBT has a strong floor effect compared to the ARAT. This effect is because the ARAT allocates several points to patients who can move their arms and hands but cannot pick up the relevant object while the BBT does not. On the other hand, they will have some scores after the training until the restoration on their arms and hands by picking up everything required in the test and receive a score of 57 on the ARAT. However, the participants' capacity may be improving, especially in terms of speed and quantity of objects transported, and the evaluation of BBT can offer the different scores. Despite this fact, the ARAT was found to have only a very small ceiling effect compared to the BBT, which may have been due to the limited number of participants examined and the severity of their disability, with most being moderately or severely disabled, factors that made it difficult to detect a ceiling effect. If a greater number of participants with a mild level of disability had been included, the ARAT may have been found to have a more pronounced ceiling effect compared to the BBT.

Wade, the first author to review UE motor function tests commonly used in stroke rehabilitation, recommended selecting a test based on consideration of the amount of time required to administer the test; its levels of validity, reliability, and sensitivity, if known; the domains it covers (impairment or disability); and whether it is composed of a battery of tasks[20]. According to the results of the present study regarding the floor effect of the BBT, the ARAT provides a much better assessment in cases of severe disability of UE function, whereas the BBT provides a better assessment in cases of mild or moderate disability. Therefore, the simplicity and feasibility of obtaining an outcome measure must be weighed against the time, equipment, and training necessary to obtain the measure, and the selection of each dexterity test should be based on consideration of each type of functional performance that is to be assessed.

Compared to the ARAT, the BBT offers the advantages of being less time consuming to complete (requiring only 1 to 2 minutes), requiring the use of less equipment, and providing easily understandable directions for performing tasks, but is less able to evaluate multiple tasks of varying complexity. While the ARAT offers the advantage of being able to evaluate multiple tasks of varying complexity, thereby providing a more comprehensive assessment of UE functional capacity. However, it is more complex to administer, requires considerably more equipment, and is more time consuming (requiring 8 to 10 minutes) compared to the BBT. Many researchers have used

both tests to assess neurological patients, including those with multiple sclerosis and traumatic brain injury[9], because neither test offers a single valid and reliable means of capturing the full range of "real life" functioning in the hemiparetic upper limb within one outcome measure[19]. The authors would recommend that ARAT is more suitable for patients with moderate to severe hemiparesis. On the other hand, the BBT is more fit for assessment of patients with mild to moderate and moderate weakness. Since it is not possible for a patient who does not have adequate arm strength and grip function to transport the cube, to get a score in BBT. It is possible that modifying BBT scoring rules may be able to overcome the floor effect by differentiating the patients with no active movement of the arm at all, those who can partially move it and those who can raise the arm against gravity. Further research should be done to see if modifying the BBT in such a way might improve the floor effect of BBT.

Conclusion

The ARAT and the BBT scores have an excellent level of concurrent validity ($r_s \geq 0.09$, $p < 0.001$) and a high level of responsiveness to change, indicating that both can detect change resulting from intervention over time. Although the BBT has a floor effect compared with the ARAT while the ARAT has a small ceiling effect compared with the BBT, the BBT is a suitable means of assessing UE function, particularly in mildly to moderately disabled patients when time is a limiting factor.

Acknowledgement

The authors wish to thank Stefan Hesse, Cordula Werner, and Anita Bardeleben of the Medical Park Berlin, Department of Neurological Rehabilitation, Charite University Medicine, Berlin, Germany, for assisting with manuscript formation and to Jan Mehrholz of the Department of Neurological Rehabilitation, Klinik Bavaria, Germany for serving as a statistical advisor.

Funding

Ramathibodhi Hospital, Mahidol University is the source of funding and no any role of the funder for the present study and for the original study on which the present article is based. This study is a sub-study of the larger "Cognitive Sensory Motor Training Induced Brain Plasticity and Upper Extremity Functions Recovery after Stroke" study.

Potential conflicts of interest

None.

References

1. Viriyavejakul A. Stroke in Asia: an epidemiological consideration. Clin Neuropharmacol 1990; 13 (Suppl 3): S26-33.
2. Langhorne P, Bernhardt J, Kwakkel G. Stroke rehabilitation. Lancet 2011; 377: 1693-702.
3. Wade DT. Measurement in neurological rehabilitation. 6th ed. Oxford: Oxford University Press; 2000.
4. Platz T, Pinkowski C, van Wijck F, Johnson G. Arm rehabilitation measurement: Manual for performance and scoring of the Fugl-Meyer test. Baden-Baden: Deutscher Wissenschafts-Verlag; 2005.
5. Van der Lee JH, De Groot V, Beckerman H, Wagenaar RC, Lankhorst GJ, Bouter LM. The intra- and interrater reliability of the action research arm test: a practical test of upper extremity function in patients with stroke. Arch Phys Med Rehabil 2001; 82: 14-9.
6. Desrosiers J, Bravo G, Hebert R, Dutil E, Mercier L. Validation of the Box and Block Test as a measure of dexterity of elderly people: reliability, validity, and norms studies. Arch Phys Med Rehabil 1994; 75: 751-5.
7. Lyle RC. A performance test for assessment of upper limb function in physical rehabilitation treatment and research. Int J Rehabil Res 1981; 4: 483-92.
8. de Weerdt WJG, Harrison MA. Measuring recovery of arm-hand function in stroke patients: a comparison of the Brunnstrom-Fugl-Meyer Test and the Action Research Arm Test. Physiother Can 1985; 37: 65-70.
9. Platz T, Pinkowski C, van Wijck F, Kim IH, di Bella P, Johnson G. Reliability and validity of arm function assessment with standardized guidelines for the Fugl-Meyer Test, Action Research Arm Test and Box and Block Test: a multicentre study. Clin Rehabil 2005; 19: 404-11.
10. Jansa J, Pogacnik T, Gompertz P. An evaluation of the Extended Barthel Index with acute ischemic stroke patients. Neurorehabil Neural Repair 2004; 18: 37-41.
11. Mehrholz J, Wagner K, Rutte K, Meissner D, Pohl M. Predictive validity and responsiveness of the functional ambulation category in hemiparetic patients after stroke. Arch Phys Med Rehabil 2007; 88: 1314-9.

12. Nijland R, van Wegen E, Verbunt J, van Wijk R, van Kordelaar J, Kwakkel G. A comparison of two validated tests for upper limb function after stroke: The Wolf Motor Function Test and the Action Research Arm Test. J Rehabil Med 2010; 42: 694-6.
13. Rabadi MH, Rabadi FM. Comparison of the action research arm test and the Fugl-Meyer assessment as measures of upper-extremity motor weakness after stroke. Arch Phys Med Rehabil 2006; 87: 962-6.
14. Hsieh YW, Wu CY, Lin KC, Chang YF, Chen CL, Liu JS. Responsiveness and validity of three outcome measures of motor function after stroke rehabilitation. Stroke 2009; 40: 1386-91.
15. Mead GE, Lewis SC, Wardlaw JM, Dennis MS, Warlow CP. How well does the Oxfordshire community stroke project classification predict the site and size of the infarct on brain imaging? J Neurol Neurosurg Psychiatry 2000; 68: 558-62.
16. Spilker J, Kongable G, Barch C, Braimah J, Brattina P, Daley S, et al. Using the NIH Stroke Scale to assess stroke patients. The NINDS rt-PA Stroke Study Group. J Neurosci Nurs 1997; 29: 384-92.
17. Croarkin E, Danoff J, Barnes C. Evidence-based rating of upper-extremity motor function tests used for people following a stroke. Phys Ther 2004; 84: 62-74.
18. Ashford S, Slade M, Malaprade F, Turner-Stokes L. Evaluation of functional outcome measures for the hemiparetic upper limb: a systematic review. J Rehabil Med 2008; 40: 787-95.
19. Lin JH, Hsu MJ, Sheu CF, Wu TS, Lin RT, Chen CH, et al. Psychometric comparisons of 4 measures for assessing upper-extremity function in people with stroke. Phys Ther 2009; 89: 840-50.
20. Wade DT. Measuring arm impairment and disability after stroke. Int Disabil Stud 1989; 11: 89-92.

Appendix 1. Action research arm test recording sheet

Subtest group	Functional test	Evaluation score	
		Pretreatment	Posttreatment
Grasp	1. Woodblock 10 cm (if score = 3, total = 18 and go to Grip)		
	2. Woodblock 2.5 cm (if score = 0, total = 0 and go to Grip)		
	3. Woodblock 5 cm		
	4. Woodblock 7.5 cm		
	5. Cricketball 7.5 cm diameter		
	6. Stone 10*2.5*1 cm		
	Subtotal Grasp	/18	/18
Grip	1. Pour water from glass to glass (pronation) (if score = 3, total = 12 and go to Pinch)		
	2. Tube 2.25 cm (if score = 0, total = 0 and go to Grip)		
	3. Tube 1 cm		
	4. Washer over bolt		
	Subtotal Grip	/12	/12
Pinch	1. Ball bearing 6 mm, thumb and ring finger (if score = 3, total = 18 and go to Gross Movement)		
	2. Marbel, 1.5 cm, thumb and index finger (if score = 0, total = 0 and go to Gross Movement)		
	3. Ball bearing thumb and middle finger		
	4. Ball bearing thumb and index finger		
	5. Marbel thumb and ring finger		
	6. Marbel thumb and middle finger		
	Subtotal Pinch	/18	/18
Gross Movement	1. Place hand behind head (if score = 3, total = 9 and finish; if score = 0, total = 0 and finish)		
	2. Place hand on top of head		
	3. Hand to mouth		
	Subtotal Gross Movement	/9	/9
Total Score		/57	/57

การศึกษาความสัมพันธ์ของเครื่องมือประเมินความสามารถของการใช้งานแขนและมือ action research arm test และ box and block test ในผู้ป่วยโรคหลอดเลือดสมอง

รัตนาพรรธณ์ จันทร์อุบล, ภาริส วงศ์แพทย์, นภาพิตร ชวนิชย์, วารี จิรอดิศัย, พัชรวิมล คุปต์นิรัติศัยกุล, ฉัฐยา จิตประไพ

วัตถุประสงค์: *ศึกษาความสัมพันธ์ของแบบประเมินความสามารถของการใช้งานแขนและมือ action research arm test (ARAT) และ box and block test (BBT) ซึ่งเป็นแบบประเมินที่ใช้บ่อยในผู้ป่วยโรคทางระบบประสาท*

วัสดุและวิธีการ: *ผู้ป่วยที่มีอาการอ่อนแรงครึ่งซีกจากโรคหลอดเลือดสมองครั้งแรกจำนวน 40 ราย สามารถสื่อสารและมีความสามารถในการรู้คิดได้ และไม่มีประวัติข้อแขนและมือยึดติด ได้รับการประเมินความสามารถของการใช้งานแขนและมือด้วยแบบประเมิน ARAT และ BBT ก่อนเริ่มการฟื้นฟูสมรรถภาพ และหลังการฟื้นฟูแล้ว 4 สัปดาห์ วิเคราะห์ผลโดย Wilcoxon sign-rank, Spearman's rank correlation, standardized response mean และการศึกษาการกระจาย*

ผลการศึกษา: *แบบประเมินทั้งสองแบบตอบสนองต่อการเปลี่ยนแปลงทางคลินิกและมีความสัมพันธ์กันสูง แบบประเมิน BBT มี Floor effect เมื่อเปรียบเทียบกับ ARAT แต่แบบประเมิน ARAT แสดง Ceiling effect ไม่ชัดเจนเมื่อเปรียบเทียบกับ BBT*

สรุป: *แบบประเมิน ARAT และ BBT มีความเที่ยงตรงสูงมาก และเหมาะสำหรับการประเมินการเปลี่ยนแปลงทางคลินิกได้ดี สามารถใช้แบบประเมิน BBT เพื่อประเมินการใช้งานแขนและมือได้อย่างมีประสิทธิภาพ*