Original Article

Effect of Vojta Therapy on Balance and Walking of Community Dwelling Chronic Stroke Patients

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ABSTRACT

Objectives: To evaluate effect of Vojta Therapy on balance and walking of community dwelling chronic stroke patients.
Study design: Single group clinical trial with pre and post test.
Setting: VojtaTherapy clinic, Division of Physical Therapy, Department of Rehabilitation Medicine, Trang Hospital.
Subjects: Community dwelling chronic stroke patients with abnormal gait referred to the VojtaTherapy clinic.
Methods: Every participant did a timed up and go test (TUGT) immediately before and after the VojtaTherapy. Techniques were chosen according to response of patients with 30 minutes per session. Treatment and assessment were repeated once a week for three weeks.
Results: Twenty chronic stroke patients with average age of 63.1 (SD = 13.23) years and average duration after stroke of 58.35 (SD = 52.83) months were enrolled into the study. The median TUGT scores of the first, second and third pre-treatment were 28, 22 and 19.5 respectively. Friedman test demonstrated a significant difference ($p < 0.001$). Median TUGT Score of the first, second, and third post treatment TUGT score were 22.5, 18 and 18.5 respectively. Wilcoxon test showed significant difference of pre versus post treatments in everysessions ($p < 0.0001$).
Conclusion: Once a week of VojtaTherapy for three weeks can improve walking in community dwelling chronic stroke patients.

Keywords: stroke, hemiplegia, balance, walk test, rehabilitation

ASEAN J Rehabil Med. 2020; 30(1): 21-25 .

Introduction

Stroke is the most common cause of neurological disability in adult.[1] Walking limitation is the number one concern of stroke patients and family.[2] There are many methods for balance and walking rehabilitation as group or individual training or therapies.[3,4] These include the use of resistive exercise,[5] treadmill training,[6] robot assisted gait training,[7] task-oriented circuit class,[8] virtual reality,[9] whole body vibration,[10] orthosis,[11] electrical stimulation[12] etc. However, several chronic stroke patients still have poor balance and walking limitation. This significantly reduce quality of life and increase risk of falling.[14] Falling rate in chronic stroke patients was reported 0.88 falls per person per year.[15] This is almost triple of the falling rate in community dwelling normal elderly persons.[16] There is a need to search for a novel and perhaps more effective form of therapy.

"Vojta Therapy" also known as "reflex locomotion therapy" was invented in the 60's by Prof. Václav Vojta.[17] It was proposed that facilitation of reflex creeping and reflex rolling motor pattern through specific positioning of body segments and manual compression of contact or "trigger zones" could improve automatic postural control and other aspects of motor functions. The application of Vojta Therapy does not require complicated and expensive high technological equipment. Previous research showed that Vojta Therapy can improve balance and walking in cerebral palsy children,[18] and elderly persons.[19] It is expected that Vojta Therapy may significantly improve trunk control and gait ability when applied to early subacute stroke patients.[20] However, there has never been a research study of the effect of Vojta Therapy on gait and balance of chronic stroke patients. There are many ways to measure change of balance ability,[21] or gait function,[22] Timed Up and Go Test (TUGT) is perhaps one of the simplest timed walk tests which is proven to be valid and reliable for balance and gait function assessment in chronic stroke patient.[23]

Therefore, the goal of this study was to demonstrate immediate effect of Vojta Therapy on TUGT score in chronic community dwelling stroke patients.

Methods

Participants

All stroke patients with chronic hemiparesis (at least 6 months) who were referred to the VojtaTherapy clinic at Trang Hospital during the months of August until October 2019 were invited to participated in this study and gave informed consent.

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Received: 17th October 2019 Revised: 24th November 2019 Accepted: 22nd January 2020

Inclusion criteria

- Ability to adequately understand and cooperate to the purpose of the study
- Medically stable
- Ability to walk independently for at least 20 meters with/or without gait aid

Exclusion criteria

- Unwillingness to attend every session of the therapy and assessment appointment through the whole study period, at the hospital for Vojta Therapy and gait assessment.

Steps of the study

Each patient visited the hospital once a week for three consecutive weeks. Balance and gait were assessed with timed up-and-go (TUGT) test before and after each therapy session. The therapy was delivered by the first author who is certified physiotherapist for adult Vojta Therapy by the International Vojta Society. During the therapy each patient was positioned in one of the three standard starting positions and received manual pressure point stimulation according to the method of Vojta Therapy.[17] The positioning of the limbs, spinal alignment, direction and force of pressure acting on the trigger zone, number and location of trigger zone to use, were constantly adjusted to maintain optimal response. Patients were not required to voluntarily contract muscles or try to do any active movement, but they should not sleep during the therapy. Between the therapy sessions, they were advised to do normal daily activities as they usually did but no additional or new exercise was recommended.

Immediately before and after each therapy session, patients were instructed to sit on a steady standard size chair with back rest but no arm support which was placed facing a 3 meters walkway. The assessing therapist who was not the same person as the treating therapist, gave verbal instruction to the patient that after the signal "go!" he/she should stand up, walk to the opposite end of the 3 meters walkway, turn around and walk back toward the chair, and turn to sit down in the chair without any pause. Touching the chair was prohibited but gait aids such as a cane or walker were allowed. They were also instructed to walk at a fastest speed in which they felt steady and secured. A stopwatch was used to measure the time in seconds used.

Statistical analysis

Descriptive statistic was used for demographic data. Friedman test was used to demonstrate change through the three pre-therapy TUGT score. Wilcoxon test was used to demonstrate difference between pre versus post therapy score of each session. Statistic calculation were made with MedCalc Statistical Software version 19.1 (MedCalc Software by, Ostend, Belgium; https://www.medcalc.org; 2019)

Results

Twenty chronic stroke patients, 15 males and 5 females, were included in the study. Average (SD was 63.1 (13.23) years. Average (SD) duration after stroke was 58.35 (52.83) months. Average (SD) weight, height and BMI were 61.8 (12.59) kg, 163.1 (7.40) centimeters and 23.1 (3.77) Kg/m^2, respectively. Fifteen patients had right hemiparesis and the rest had left hemiparesis. There were 9 ischemic and 11 hemorrhagic stroke cases. There were no dropouts. And data of individual subjects can be found in table 1.

Average and median TUGT score (time used in seconds) which were obtained before and after each of the three therapy sessions can be seen in table 2. The median TUGT scores of the first, second and third pretreatment TUGT were 28, 22 and 19.50 seconds respectively. Friedman test demonstrated a significant difference of these three values at *p* value 0.001.

The median TUGT Scores of the first, second, and third post treatment TUGT were 22.50, 18 and 18.50 seconds respectively. Wilcoxon test showed significant difference of pre versus post treatment in everysessions at *p* value, 0.0001

Graphical representation of individual patients' TUGT scores is shown in figure 1. There was no case which the score became worst immediately after therapy. Out of these 20 cases 19 cases in the first,16 cases in the second, and 19 case in the third therapy session showed improvement of TUGT scores immediately after the therapy.

Discussion

The immediate pre and post therapy changes of TUGT scores, despite no active therapeutic exercise of any kind, are interesting. There was no worsening of TUGT scores after therapy. This is probably because through the stimulation of "reflex locomotion" motor patterns, Vojta Therapy might facilitate a more effective automatic postural regulation.[17-20] When looking at the average score after one session and the score before the next session, after one week pause with no intervention at all (Table 1), the effects of therapy appear to be somewhat maintained during the pause between the end of one session and the next pre-session assessment.

Repeated stimulation resulted in significant continuous improvement of TUGT scores. During each session of Vojta Therapy several combinations of "trigger zone" compression plus a set of specific body positioning is maintained for up to 25 minutes. This, in combination with an isometric resistance applied to the head to stop any reflex induced rotation of the head, could lead to temporal and spatial summation of intensive non-nociceptive proprioceptive and tactile afferent signals. It is well known that such a prolonged facilitation could result in a long-lasting hyperexcitable state of the nervous system which is known as "long term potentiation".[24,25]

Table 1. Demographic data and individual timed up and go test (TUGT) scores (in seconds) of each participant

Case No.	Age	Sex	Effected side	Duration in (months)	TUG Pre 1	TUG Post 1	TUG Pre 2	TUG Post 2	TUG Pre 3	TUG Popst 3
1	33	Male	Rt.	15	18	15	16	15	15	13
2	76	Male	Rt.	88	24	23	22	20	22	21
3	55	Female	Lt.	15	40	40	41	35	37	32
4	58	Male	Rt.	29	47	37	43	34	41	34
5	66	Male	Rt.	49	39	31	30	29	33	31
6	55	Male	Lt.	107	10	9	9	9	9	8
7	65	Male	Lt.	204	43	38	42	36	42	33
8	78	Male	Rt.	102	17	16	15	15	15	13
9	80	Male	Rt.	34	23	20	14	12	14	13
10	66	Male	Lt.	9	26	20	26	18	20	19
11	77	Female	Rt.	8	30	24	18	16	19	18
12	80	Male	Rt.	26	21	12	12	12	12	10
13	73	Male	Rt.	137	41	39	36	34	36	33
14	45	Female	Rt.	11	23	21	19	18	17	16
15	55	Male	Lt.	30	41	31	29	28	34	29
16	54	Male	Rt.	139	38	22	25	18	23	19
17	51	Male	Rt.	17	32	25	22	18	17	15
18	76	Male	Rt.	42	16	13	13	12	13	11
19	69	Female	Rt.	39	97	76	65	54	56	50
20	50	Female	Rt.	66	12	10	10	10	9	9

Table 2. Timed up and go test (TUGT) scores (in seconds) of three pre and post Vojta Therapy sessions

	TUGT Pre 1	TUGT Post 1	TUGT Pre 2	TUGT Post 2	TUGT Pre 3	TUGT Post 3
Sample size	20	20	20	20	20	20
Minimum	10	9	9	9	9	8
Maximum	97	76	65	54	56	50
Average (SD)	28.00 (18.96)	22.50 (15.28)	22.00 (14.19)	18.00 (11.64)	19.50 (13.08)	18.50 (11.20)
Median	28	22.50	22	18	19.50	18.50
Interquartile range	21.33 to 39.83	16.678 to 31.00	15.16 to 29.83	15.00 to 28.83	15.00 to 33.83	13.00 to 30.66
Hodges-Lehmann median difference	-5.00		-3.00		-2.50	
95% Confidence interval of the difference	-8.00 to -3.00		-5.00 to -1.00		-4.00 to -1.50	
Number of cases with improved score after each therapy session	19		16		19	
Wilcoxon test	$p < 0.0001$		$p < 0.0001$		$p < 0.0001$	
Friedman test[a]			$p < 0.0001$			

[a]Comparing Pre 1 TUGT, Pre 2 TUGT and Pre 3 TUGT

In this study all patients had stroke longer than 6 months after stroke. No instruction was given for the patient to do any kind of exercise at home. Therefore, these reductions of the time required to complete the TUGT test were not likely to be the result of spontaneous recovery, un-prescribed active gait training, or even placebo effects. The difference of average TUGT scores between the first and the last assessment in this study were 9.50 seconds, this was larger than 3.4 second which is the minimal clinically important difference (MCID) level of TUGT established in adult population with back pain.[26] But small sample size and the lack of control group necessitate a future randomized control study with adequate sample size is warranted.

The authors had strictly adhered to the standard TUGT test procedure. All measurements were made once without repetition. No averaging was applied because repeated timed walking would necessitate patient to walk totally 6 laps per session and as such fatigue of the patient could potentially compromise the reliability of test score. For these reasons, the reliability of TUGT score in this study can be expected to be acceptable.

Despite of the short-term improvement of gait speed and balance, a prospective randomized control study is needed to confirm the result. Further study should assess not only short term but also longer-term gait and balance outcome. They could as well study the effect of different therapy intensity in term of therapy frequency and duration.

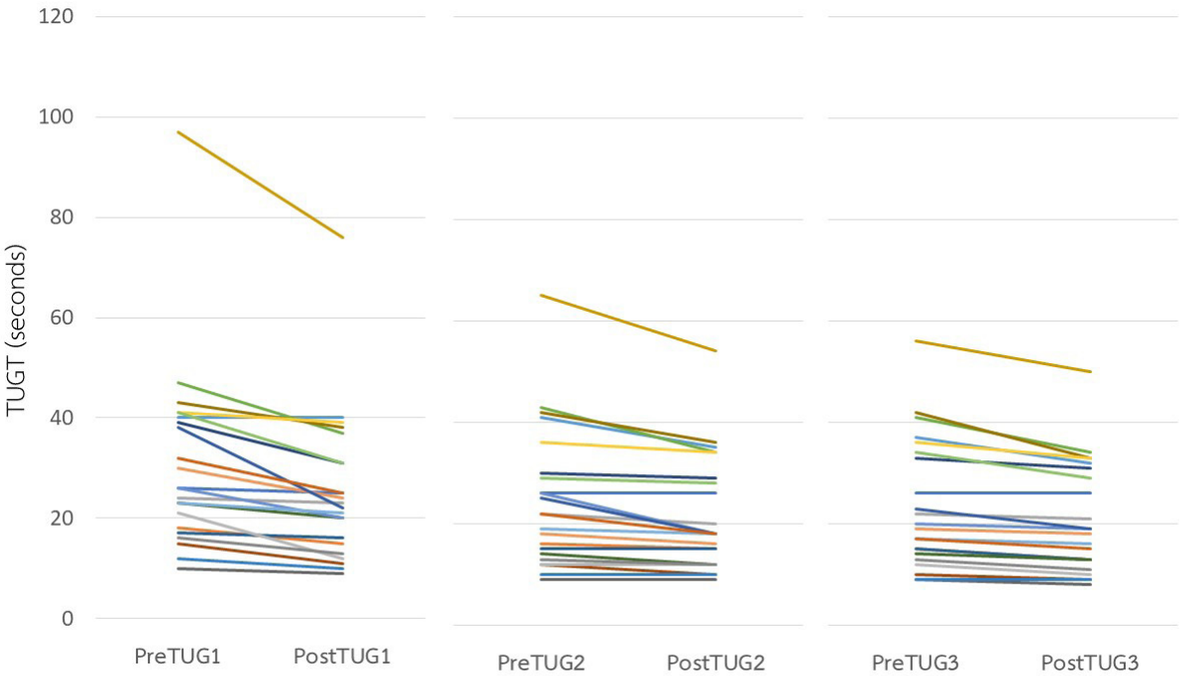

Figure 1. Individual TUGT scores of all subjects before and after each weekly Vojta Therapy sessions.

The maintenance of increased TUGT score in the period after cessation of stimulation is another interesting research question. Since there has been no study comparing the effects of combining Vojta therapy and exercise-based gait and balance training programs, a research that study the effects of the combination of Vojta Therapy plus other gait training method such as body weight supported treadmill training or other balance training protocol could be carried out. It would be interesting to see if such combination brings greater or faster recovery.

In conclusion, Once a week of 30 minutes session of Vojta Therapy for three weeks could significantly improve walking measured with the time up and go test in chronic stroke patients.

Disclosure

Watcharin Tayati, Niranya Chompunuch and Assistant Professor Parit Wongphaet declare no conflict of interest of any kind.

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