Can Addition of Motivational Interviewing to Conventional Therapy and Task Oriented Training Improve Outcome After Stroke? A Randomized Controlled Trial

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Abstract

Background: Stroke can result in loss of self-efficacy in the use of upper limb for functional activities. Thus, many techniques such as conventional therapy (CT) and task oriented training (TOT) are used for the rehabilitation of upper limb function. Recently, studies included motivational interviewing (MI); a talk based therapy that improves self-efficacy. When patients have high self-efficacy, this can make them achieve functional independence. The aim of this study is to find out the whether addition of MI to CT and TOT will improve self-efficacy in the use of upper limb.

Methods: The study was a randomized controlled trial approved by the ethical committees of AKTH and KHMB. The subjects were randomly assigned into 4 groups (CT, TOT and CT+MI and TOT+MI) with 7 subjects each. CT received weight bearing exercises on the affected limb, passive and active movements and therapeutic positioning. TOT performed 8 functional tasks of their convenience. CT+MI received similar tasks in CT and received MI. TOT+MI performed similar tasks in TOT and received MI. All groups received treatments for 3 hours per day, 5 times a week for 4 weeks. However, CT+MI and TOT+MI groups received MI in addition for 10 minutes per session during weekly visit.

Results: TOT, CT+MI and TOT+MI showed significant improvement in self-efficacy post-intervention ($p<0.05$). However, there was no significant difference in the use of CT+MI and TOT+MI ($p>0.05$).

Discussion: Addition of motivational interviewing to CT and TOT improves self-efficacy in the use of upper limb following a stroke and patients who may benefit fromthis protocol are those with no significant motor and cognitive impairments. However, the study is limited as no power calculation was conducted to determine number of subjects required for generalizing the study findings, and therapists and the assessors were not blinded.

Key words: stroke, conventional therapy, motivational interviewing, self-efficacy, upper limb and task oriented training

Introduction

Stroke is a leading cause of disability secondary to impairments such as motor, sensory and cognitive impairments. For motor impairment following a stroke, there are many techniques such as conventional therapy (CT) and task oriented training (TOT) used for its rehabilitation (Rensik et al., 2009; Wang et al., 2011; Bostch et al., 2014). The protocol of conventional therapy usually includes passive and active movements, strengthening and range of motion exercise, neuromuscular facilitation techniques andtherapeutic positioning (Dromerick et al., 2000; Page et al., 2005; Atteya, 2004). However, comparisons of conventional therapy versus task oriented training revealed a better small effect in

favour of the latter (French et al., 2008; Rensik et al., 2009; Sirtori et al., 2009).

Task oriented training as a rehabilitation technique focuseson the practice of functional activities similar to those we carry out in our daily life such as eating from the plate, buttoning a shirt and writing (French et al., 2008;Rensik et al., 2009). This kind of functional tasks training are premised on its effectiveness at counterbalancing leaned non-use (Taub et al., 1993) which could result from lack of intrinsic motivation known as self-efficacy to use the limb after stroke owing to increasing frustration at failure in several or many attempts to perform tasks. More recently, some procedures of extrinsic motivation are introduced in stroke rehabilitation (Watkins et al., 2007; Watkins et al., 2011).

Motivational interviewing (MI) on the other hand is a talk based therapy, and extrinsic motivation strategy aimed at improving self-efficacy (Rollnick & Miller, 2008). It is a procedure which was used initially in the rehabilitation of people with substance addiction problems. However, it was later used with tremendous success in stroke rehabilitation to improve quality of life and other outcomes (Brodie et al., 2008; Kidd et al., 2015; Cheng et al., 2015). The aim of this study is to find out whether the addition of motivational interviewing to CT and TOT can improve self-efficacy outcome during upper limb rehabilitation after stroke.

Materials and methods

Study design

This study was a randomized controlled approved by the Research ethics committees of Kano State Hospitals Management Board (KHMB) and Aminu Kano Teaching Hospital (AKTH). The study was aimed at finding out the effect of the use of4 weeks motivational interviewing in addition to CT and TOT to improve self-efficacy during upper limb rehabilitation after stroke.

Subjects

The study subjectswerestroke survivors attending Physiotherapy in Aminu Kano Teaching Hospital, Murtala Muhammad Specialists Hospital and Muhammad Abdullahi Wase Specialists Hospital. Subjects were included if they fulfilled the following criteria: adult stroke survivors ≥ 18 years, subjects who are stable and mentally fit (Mini Mental State Examination score ≥ 24) and subjects who can at least extend their interphalangeal and metacarpophalangeal joints to 10^{o} and 20^{o} respectively. Subjects were excluded on the other hand, if they have any upper limb deformity that could prevent movement and if they declined consent.

Forty subjects were screened for theeligibility to participate in the study.However, only a sample of 28 subjects completed the study.

Materials

The materials used in the study include a full circle goniometer to measure wrist and fingers extension, Minimental state examination to assess mental state of the patients and Stroke self-efficacy questionnaire (SSQ). The SSQ is a 13 items valid and reliable questionnaire assessing patients' confidence in performing functional tasks after stroke(Jones et al., 2008). The scale is rated on a 10 point scale ranging from 0 to 10 in which 0 denotes not confident at all and 10 denotes very confident.

Procedure

Details of the study procedure were explained to the patients and they were told that they are at the liberty to withdraw from the study at any point. For those who fulfilled the study inclusion criteria, random assignment using sealed envelopes was used to allocate them to 4 groups, Conventional therapy (CT group), Task oriented training (TOT group), Conventional therapy and Motivational intervention (CT+MI group) and Task oriented

training and Motivational intervention (TOT+MI). The CT group received passive and active movements, therapeutic positioning and weight-bearing on the affected limb while sitting in a couch. The TOT group performed 8 functional tasks suitable to them. The CT+MI group performed the same tasks in CT groupand Motivational interviewing after every session. The TOT+MI group performed similar tasks in TOT group andMotivational interviewing after every session.The Motivational interviewing focused on the difficulty the participants faced in their rehabilitation, and encouragement and suggestions for the ways forward were offered. The motivational interviewing usually lasted for about10 minutes per session on a weekly visit. Treatments in all the groups lasted for 3 hours per session, 5 days per week for 4 weeks. The patients and their relatives were taught the procedure in their relevant groups and asked to practice at home as per the above protocol. Demographic data such as age, sex, time since stroke, side affected, MMSE scores, and type of stroke were collected using a demographic data sheet. Data on Stroke Self-efficacy questionnaire was collected at baseline, and 2 and 4 weeks post-intervention.

The data obtained on self-efficacy is not normally distributed (Kolmogorov-Smirnov test, $p<0.05$), and therefore Non-parametric test was used for the data analysis. The difference in within group self-efficacy scores between baseline, 2 and 4 weeks post-intervention was analyzed using Friedman tests. Where there was a significant difference, a Wilcoxon rank signed test was used as post-hoc analysis to determine where the difference lies. For the difference in between groups' self-efficacy scores at baseline, 2 and 4 weeks post-intervention, Kruskal-Wallis test was used for the analysis. Where there was a significant difference, Mann-Whitney U test was used as post-hoc analysis to determine where the difference lies. All analyses were carried out using SPSS version 20 at $p<0.05$.

Results

Twenty eight stroke patients with age range 45 to 58 completed the study. There were no significant differences between groups in the demographic characteristics including the mean age, time since stroke and the ratio of males to females, type of stroke and sided affected of the body of the study subjects. This information is summarized in table I.

Within group analysis across baseline, 2 weeks and 4 weeks post-intervention using Friedman's revealed significant differences in all the 4 groups ($p< 0.05$). Details of these analyses are summarized in table II.

Since, there are significant differences within groups, post-hoc analyses using Wilcoxon rank signed test were carried to determine you're the differences lie. For the CT group, there was a

Table I: Demographic Characteristics of the Study Participants

SN	Variable	CT (n=7)	TOT (n=7)	CT+MI (n=7)	TOT+MI (n=7)	test	p-value
1	Age	52.29±3.45	50.29±5.44	52.57±2.51	50.00± 3.16	F	0.47
2	Sex (M/F)	3/4	3/4	3/4	4/3	X^2	0.94
3	Time since stroke	14.71±7.16	17.71±10.21	14.57±6.68	15.43±9.96	F	0.90
4	Type of stroke (I/H)	5/2	4/3	6/1	5/2	X^2	0.72
5	Side affected (L/R)	3/4	2/5	5/2	4/3	X^2	0.43

Key: M/F=Male/Female, I/H=Ischaemic/Haemorrhagic, L/R=Left/Right, CT=Conventional therapy, TOT=Task oriented training, CT+MI=Conventional therapy + Motivational interviewing, TOT+MI=Task oriented training+ Motivational interviewing.

Table II: Differences in Self-efficacy Between Baseline, 2 weeks and 4 weeks Post-intervention in the 4 Groups

SN	Study Group	n	Time period Median score			X^2	p-value
			Baseline	2 weeks	4 weeks		
1	CT	7	4.00	5.00	5.00	7.00	0.030
2	TOT	7	3.00	4.00	6.00	12.00	0.002
3	CT+MI	7	4.00	6.00	7.00	14.00	0.001
4	TOT+MI	7	4.00	6.00	8.00	14.00	0.001

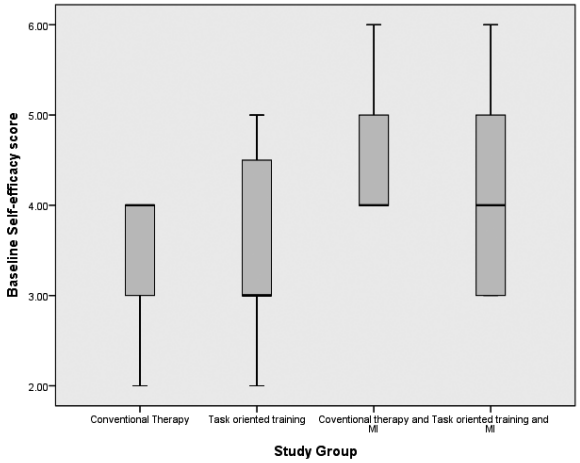
Key: CT=Conventional therapy, TOT=Task oriented training, CT+MI=Conventional therapy + Motivational interviewing, TOT+MI=Task oriented training+ Motivational interviewing.

significant difference between baseline and 2 weeks post-intervention (Z=-2.271, p=0.023) with a large effect size (r=0.90). However, there were no significant differences between baseline and 4 weeks post-intervention (Z=-1.930, p=0.023) with a large effect size (r=0.73), and between 2 week and 4 week post-intervention (Z=0.001, p=1.00) with effect size (r=0).

For the TOT group, there were significant differences between baseline and 2 weeks post-intervention (Z=-2.121, p=0.034) with a large effect size (r=0.80), between baseline and 4 weeks post-intervention (Z=-2.414, p=0.016) with a large effect size (r=0.91) and between 2 weeks and 4 weeks post-intervention (Z=-2.121, p=0.034) with a large effect size (r=0.80). For CT+MI group, there were significant differences between baseline and 2 weeks post-intervention (Z=-2.530, p=0.011) with a large effect size (r=0.95), between baseline and 4 weeks post-intervention (Z=-2.401, p=0.016) with a large effect size (r=0.91) and between 2 weeks and 4 weeks post-intervention (Z=-2.414, p=0.016) with a large effect size (r=0.91). For TOT+MI group, there were significant differences between baseline and 2 weeks post-intervention (Z=-2.456, p=0.014) with a large effect size (r=0.93), between baseline and 4 weeks post-intervention (Z=-2.379, p=0.017) with a large effect size (r=0.90) and between 2 weeks and 4 weeks post-intervention (Z=-2.401, p=0.016) with a large effect size (r=0.91).

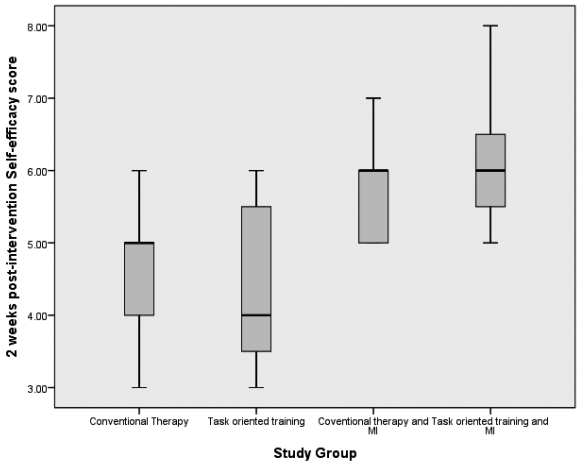
Between groups analyses

A Kruskal-Wallis Test revealed a no statistically in self-efficacy scores across groups at baseline, $x^2(3, 28) = 5.051$, p=0.168. The variability of the data across groups is presented in figure I below:

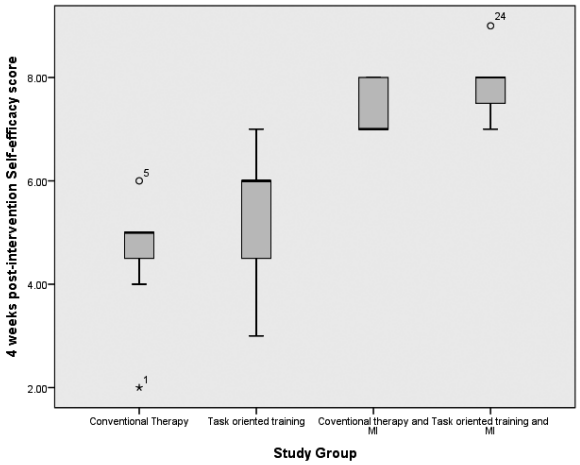


At 2 weeks post-intervention, there was a significant difference across groups, $x^2(3, 28) = 9.588$, p=0.022. Post-hoc analysis using Mann-Whitney U test revealed significant differences between CT (md=5.00) and CT+MI (md=6.00), Z=-2.089, p=0.037 with a large effect size (r=0.56), between CT (md=5.00) and TOT+MI (6.00), Z=-2.383, p=0.017 with a large effect size (r=0.64), between TOT (md= and TOT+MI (6.00), Z=-2.171, p=0.030 with a large effect size (r=0.58) and between CT+MI (md=6.00) and TOT (4.00), Z=-1.855, p=0.064 with a large effect size (r=0.50). However, there was no significant differences

between CT+MI (md=6.00) and TOT+MI (md=6.00), Z=-0.750, p=0.53with a large effect size (r=0.20). The variability of the data across groups is presented in figure II below:



Similarly, at 4 weeks post-intervention, there was a significant difference across groups, $x^2(3, 28) = 20.625$, $p<0.001$. Post-hoc analysis using Mann-Whitney U test revealed significant differences between CT (md=5.00) and CT+MI (md=7.00), Z=-3.216, p=0.001 with a large effect size (r=0.86), between CT (md=5.00) and TOT+MI (8.00), Z=-3.205, p=0.001 with a large effect size (r=0.86), between TOT and TOT+MI (6.00), Z=-2.171, p=0.030 with a large effect size (r=0.58) and between CT+MI (md=6.00) and TOT (4.00), Z=-2.968, p=0.003 with a large effect size (r=0.79). However, there was no significant difference between CT+MI (md=7.00) and TOT+MI (8.00), Z=-1.214, p=0.225with a large effect size (r=0.32). The variability of the data across groups is presented in figure III below:



Discussion

In the CT group, there was only significant improvement in self-efficacy from baseline to 2 weeks intervention with large effect size. However, in the TOT, CT+MI and TOT+MI groups, there were significant improvements from baseline to both 2 and 4 weeks post-intervention with large effect sizes.

Between groups, there was no significant difference at baseline. At 2 weeks post-intervention, CT+MI showed a higher significant improvement than CT and TOT. In contrast, TOT+MI only showed a higher improvement than CT, but not TOT. At 4 weeks, CT+MI and TOT+MI showed significant higher improvements than CT and TOT. However, there was no significant difference between CT+MI and TOT+MI at both 2 and 4 weeks post-intervention.

CT has been reported to be less effective than TOT at improving motor function (French et al., 2008; Sirtori et al., 2009; Rensik et al., 2011). However, at 2 weeks post-intervention in the present study, CT+MI demonstrated a higher median score in self-efficacy than TOT. High self-efficacy is associated with achievement of functional independence (Korpershoek et al., 2011). This seems to suggest that, addition of MI to CT protocol may improve its effectiveness. Similarly, significant improvements in self-efficacy from baseline to 2

and 4 weeks post-intervention was seen in TOT, CT+MI and TOT+MI groups. These improvements may be attributed to the techniques' abilities to reverse learned non-use and improve mood which are usually acquired following a stroke (Taub et al., 1963; Taub et al., 1993; Watkins et al., 2007; Watkins et al., 2011;French et al., 2008). Failure at several or many attempts in performance of functional tasks and psychological changes such as mood problems can negatively affect functional outcomes (Ferro et al.,2009; Teoh et al.,2009). Thus, use of MI to help improve self-efficacy outcome after stroke seems needful from the present findings. This argument seems to be better supported as one of the finding in this study showed that, there was no significant difference between TOT+MI and CT+MI post-intervention. Therefore, probably if MI is included in the protocol of CT, there may better effectiveness. Fortunately, MI has also been reported to be feasible and acceptable to both stroke patients and nurses and improve quality of life of stroke patients (Brodie et al., 2008; Kidd et al., 2015).

In the present study, the protocols of all the 4 groups used duration in hours as the dose of rehabilitation. However, it has been argued recently that this kind of dose measurement during rehabilitation is not clear and is difficult to how much rehabilitation or task practiced (Abdullahi, 2014; Kaplon et al., 2007). To solve this problem, a model which uses number of repetitions of particular rehabilitation exercise or tasks as a measure of dose has been suggested and shown to have similar or more effective than the one using duration in hours (Abdullahi, 2014; Abdulahi, 2017; Abdullahi & Danlami, 2016). Additionally, the new protocol is said to be simple, feasible, less time, cost-effective and easy to monitor by patients and caregivers.

Another problem usually encountered in rehabilitation is adherence and compliance with the prescribed protocols (Jack et al., 2010; Bollen et al., 2014). Thus, one of the probable reasons why there was significant improvement from baseline to 2 and 4 weeks post-intervention in the CT group could improve adherence to treatment. Previously, improved adherence to and compliance with exercises behaviours was reported with the use of motivational interviewing (Poirier et al., 2004). The authors argued that improvement in exercise behavior can have curative effects and improve self-esteem, self-efficacy, psychological well-being, relieve stress, provide enhanced energy and decrease feelings of depression. Similarly, the subjects in TOT, CT+MI and TOT+MI groups demonstrated improvements in self-efficacy after the interventions.

Nevertheless, the study has some limitations. One, no power calculation was conducted to determine how many subjects are required to generalize the study findings. Two, the therapists and the assessors were not blinded.

Conclusion

The study showed that, addition of MI to CT and TOT can help improve self-efficacy in the use of upper limb after stroke. However, this finding has implication both for practice and research. For practice, patients who may benefit from addition of MI to CT and TOT during upper limb rehabilitation are those with no significant motor and cognitive impairments. For research, studies of MI using of repetition of the exercise practiced in CT and the tasks performed in TOT as a measure of dose as opposed to duration in hours are needed to determine the amount practice required to combine with MI.

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