



Original Article

Effects of Task-oriented Instructions on Intensity of Practice in Stroke Rehabilitation; A Quasi-Experimental Study

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ABSTRACT

Background: The stroke or cerebrovascular accident has been caused by deprivation of blood supply to a part of the brain. Stroke has been recognized as a medical emergency that might lead to lasting functional disability and even death. Treatment management should be started as early as possible. **Objective:** To determine the effects of task-oriented instructions on the intensity of practice in stroke rehabilitation. **Methods:** This study is a quasi-experimental study in which a convenient sampling technique was employed to recruit participants in this study. The sample size was calculated using G power 3.9.1.2 version software using mean and standard deviation from the previously conducted study. Stroke patients aged between 30 to 80 years, either right or left or both sides paralyzed and with a stroke of the middle cerebral artery were recruited in this study. The patients were divided into two groups, patients in Group 1 were entertained with task-oriented instructions three times a week for four weeks and Group 2 were entertained with non-specific instructions three times a week for four weeks. Wolf motor function was used for collecting data, pre-test with non-specific instructions and post-test with task-oriented instructions. The test employed was an independent sample t-test to compare scores between groups before and after treatment. A paired sample t-test was employed to check the differences in scores before and after treatment. The p-value <0.05 was significant. **Results:** The average mean value for the score of the Wolf Motor Function test for both the groups' pre and post was 60.17 and 66.23 respectively. The value calculated for the paired sample t-test during comparison was 9.24 with a p-value equal to 0.00 which was less than the reference value that was 0.05. **Conclusion:** This study concludes that task-oriented instructions help to increase the intensity of practice in stroke rehabilitation as compared to non-specific instructions.

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INTRODUCTION

After the spell of the stroke, there is very strong evidence that patients who perform a higher amount of task-specific practice tend to achieve a much better outcome for activity performance. A systematic review was conducted which suggested that this dose-response relationship, estimated that an additional sixteen hours of therapy earlier after the spell of the stroke might result in minute to moderate improvements in activity.¹ A recently conducted systematic review showed us that at least a 240% increase in the usual time of therapy is required to produce substantial improvements in the outcomes of the activity.² Along with increased time, it appears that a high intensity of practice, which includes a higher number of repetitions is also required to improve the outcomes of activity.^{3,4} Our study with focus on this as well. J. Carey and his co-workers found out that tracking accuracy and grasp and release function were improved accompanied by neuroplastic changes observed on functional magnetic resonance imaging by using intensive finger tracking training which involves almost seven thousand repetitions over twenty sessions.³

K. Scrivener and co-workers found out that completing a higher dose of lower extremity repetitions than greater than seven hundred within the first week after the stroke eventually results in faster recovery. That faster recovery might include unaided walking and the number of lower extremity repetitions of exercise which are completed in the 1st week of stroke might predict the walking speed of stroke survivors' when he or she will be discharged from rehabilitation.⁴ Despite the availability of the current literature and the available clinical guidelines that recommend large doses of therapy after the spell of the stroke, these are not successfully being achieved in clinical practice.^{5,6} A systematic review was conducted on activities during

physiotherapy sessions. The review found out that therapy sessions are fifty minutes long and the survivors of stroke are only active for an average of 60% of the session.⁷ During these short physiotherapy sessions, a stroke survivor patient might only perform as few as thirty-two repetitions of the upper extremity, six thousand two hundred two steps of walking practice or eleven stand-ups.⁸ These mentioned amounts of practice are improbable to cause the neuroplastic changes that are sufficient to improve clinical outcomes required for a stroke survivor. More innovative and encouraging strategies are needed to aid in helping to achieve larger therapy doses within the rehabilitation settings. A scoping review of the literature of studies in which some extra practice was achieved in stroke rehabilitation found that in general it was accomplished with supervision by extra staff.⁹ This is observed as not a very justifiable solution in general clinical settings, where we have a lack of time, which is the most commonly quoted reason for not being able to increase the therapy dosages.¹⁰

The authors of the scoping review also recommend that using the goal and task-oriented instructions might increase the dosages of practice eventually by increasing the intensity at which the survivors of stroke will work with their rehabilitation session. Although using task and goal-oriented instructions to increase the intensity of practice does not seem to have been inspected and surveyed in the rehabilitation of stroke survivors. Although there are studies that have determined the effects of modifying instructions to modify the speed of task performance of survivors of stroke.¹¹⁻¹³ Our current study would also add more to the literature considering Pakistani stroke patients as the target. This research has shown us that the speed of the performance of the task increases in response to various instructions. However, those studies were not targeted to

examine changes in the intensity of practice. Therefore, those studies only examined the change in speed of one repetition of a task. Currently, there are no studies that have determined the effects of task and goal-oriented instructions to increase the intensity of practice achieved over a sustained period. Our current study will try to fill this gap and will add knowledge to the literature. If employing the task and goal-oriented instructions has a substantial effect and influence on the intensity of practice achieved, which includes intensity in terms of the rate of repetitions achieved during a session of therapy, this positive impact could increase the therapy doses without the additional staff, cost, time or equipment.¹⁴

Considering the best of the researcher's knowledge there is insufficient data which is available on this subject. This is the need of the hour to elucidate the effects of task-oriented instructions to increase the intensity of practice for rehabilitating stroke patients and to create awareness about its effects on activities of daily living. Our current study will add authentic literature considering this field and will add more to the knowledge of healthcare providers of stroke patients. Our current study would add authentic data to the literature considering the Pakistani population. Work was needed to be done on Pakistani stroke patients to determine the effects of task-oriented instructions. Whether this would increase the intensity of practice in stroke rehabilitation of the Pakistani stroke population, Since Pakistan is an underdeveloped country, more work is needed to be done on focusing on the task and goal-oriented goals here. Our study would benefit healthcare professionals in encouraging task-oriented instructions in stroke rehabilitation.

METHODS

This is a quasi-experimental study in which the sample size of this study was calculated to

be 16, by G power¹⁵ 3.9.1.2 version software with mean and standard deviation taken from the previously conducted studies. Assuming a 20% rate of alteration 16 patients would be recruited in this study with a power of 0.80 and a margin of error of 5%. The data for this study was collected from the National Hospital and Medical Center in Lahore, Pakistan. A convenient sampling technique was employed to recruit participants in this study. To find out the difference between two independent means (two groups) t-tests were employed. Stroke patients of age between 30 to 80 years, right or left or both sides paralyzed and patients with stroke of the middle cerebral artery were recruited in this study. Patients suffering from musculoskeletal problems and any other significant neurological illness were excluded from this study. Almost 16 participants were divided into two groups. Participants in Group 1 were entertained by task-oriented instructions three times a week for four weeks and participants in Group 2 were entertained with non-specific instructions three times a week for four weeks.

A written consent form in English and Urdu was given to every participant. It was signed by every participant recruited in this study. Patients recruited in this study were instructed to perform tasks to a specific level and at a specific speed and the outcome was measured using the Wolf Motor Assessment Scale. Data was entered and analyzed by Statistical Package for Social Sciences version 23. The quantitative variables were represented by mean and standard deviation while qualitative variables were represented by frequency and percentages. Kolmogorov Smirnov test was employed to assess the normality of the data. Scores between the groups before and after the treatment were compared using an independent sample t-test. To analyze the difference in scores before and after treatment, a paired sample t-test was employed.

RESULTS

The mean age of participants recruited in this study was 68.56±7.06. The average mean value for a score of the Wolf Motor Function test for both the groups’ pre and post was 60.17 and 66.23 respectively. The value calculated for the paired sample t-test during comparison was 9.240 with a p-value equal to 0.00 which was less than the reference value that was 0.05.

Table 1: Descriptive Statistics for Age, Height and BMI of the participants

Variables	Mean±S.D
Age	16±68.56
Height	16±1.57
BMI	16±32.94

DISCUSSION

Our current study found out that all the task-oriented instructions ultimately resulted in a huge increase in the rate of repetitions for an exercise when compared with the non-specific instructions. This completely agrees with the study conducted by Tessa Hillig and co-workers.¹⁴ Their study showed that there was an increase in the rate of repetitions by 62% to 128% when they were given task-oriented

Table 2: Paired Sample t-test

		Mean	S.D	Std. Error Mean
Pair 1	Pre. Score	60.17	40.06	9.72
	Post. Score	66.23	41.02	9.95

instructions. Their most effective instruction was when they encouraged the speed of the participant and motivated them to achieve their best, exercise twenty-five times as fast as you can.^{14,16} The same kind of instructions were used in our current study. Both studies agree on the fact that task and goal-oriented instructions can be used to increase the practice of rehabilitating stroke patients. Three Previously conducted research have determined the use and benefit of instructions in stroke rehabilitation to tell whether survivors of stroke can increase their speed of performing a task. Two previously conducted studies found out the speed of the movement, in which the participants were instructed to perform a reaching task at a speed within their comfort zone and then with specified instructions that motivated them to perform this task at a greater speed.^{11,12} The former study calculated a 30% increase in the speed

Table 3: Paired Differences

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre. Score - Post. Score	6.05882	2.70348	.65569	7.44883	4.66882	9.240	16	.000

Figure 1: Pre and Post-test Scores

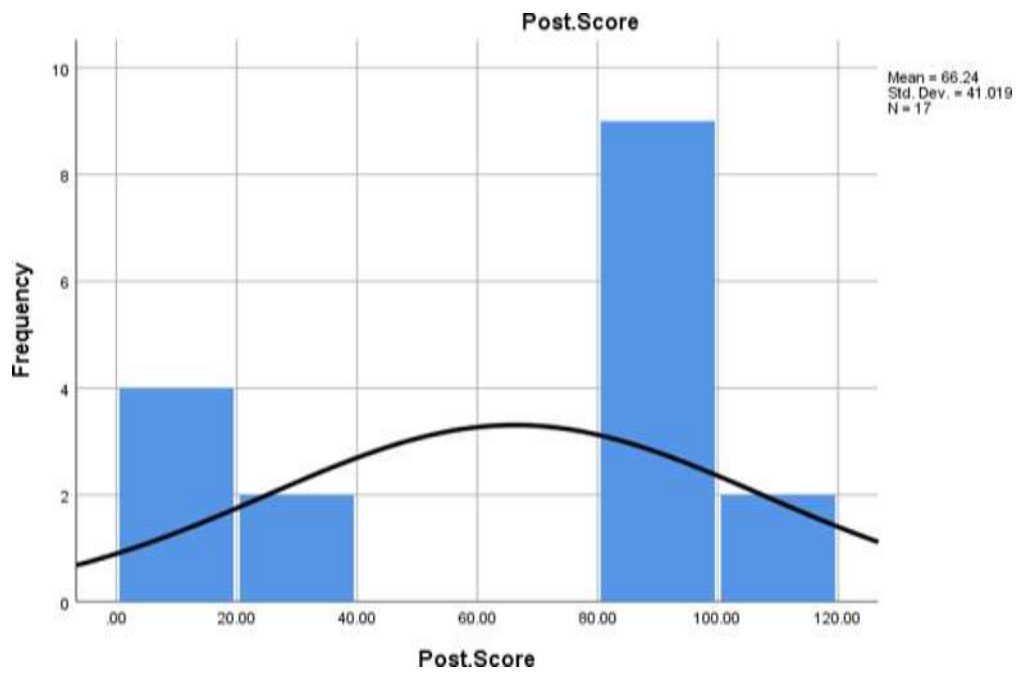
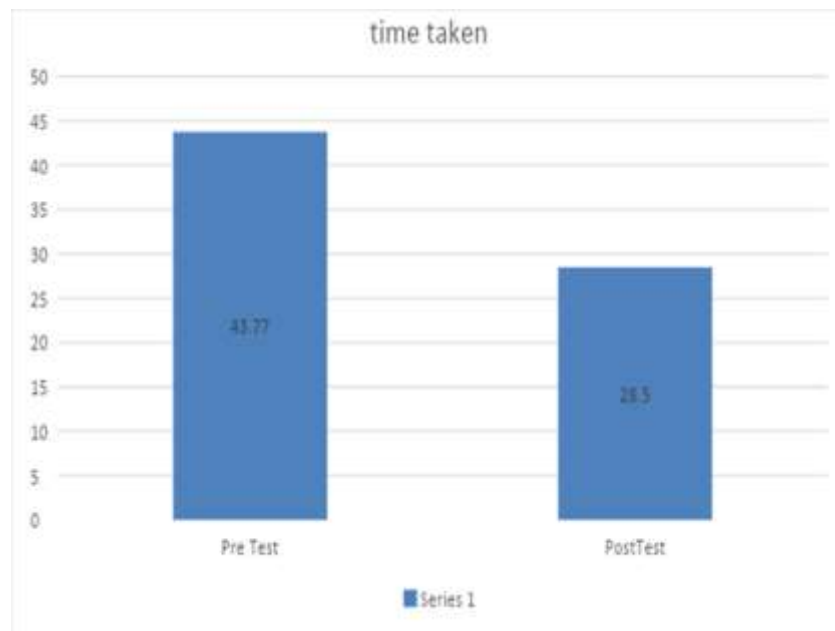


Figure 2: Time Taken by Patients for Pre and Post-Task-Oriented Instructions



of the movement¹¹ while the later study calculated a 14% increase in the spend of the movement.¹² Another study determined the

speed of walking with four different instructions regarding speed. They calculated an increase of 26% in the speed of the walking

while they utilized the maximum speed instruction.¹³ The alterations made while asked to perform a single task with goal-oriented instructions in these three research were statistically significant like our current study. Although, the previously conducted studies were investigating and determining the capacity of the stroke survivors to increase their speed of performing a single task our current study was designed to determine a strategy to increase the intensity of practice of a task over a sustained period.

The goals of Hilling and co-workers¹⁴ study coincide with the current study. The clinical significance of our current study is that it will show that using task-oriented instructions might result in increasing the intensity of practice of stroke survivors over a sustained time and thus by increasing the intensity of practice. Substantially, the increase in the intensity of the practice might be obtained without utilizing extra time, staff, costs and equipment and hence it has been recognized as an effective and feasible strategy that might be implemented in our present-day clinical settings. The greatest limitation in achieving larger doses of therapy in rehabilitation after stroke has been recognized to be a lack of time.¹⁰ Our current study agrees with this finding. Giving goal-oriented instructions might result in doubling the rate of repetitions and must increase in number of repetitions being performed in the already available time of the session. Hence, it is important for the staff to be conscious and to carefully consider the instructions they utilize during their therapy sessions. While this has been noted and seems very obvious observational studies have shown us that therapists do not use communication that contains specific information in general.^{17, 18} In our current study, the objective was not to check the change in the quality of the movement. This was a limitation in our study because encouraging the speed of a movement might

potentially result in changes in the performance of the task kinematically. This limitation was also present in a study conducted by Hilling and co-workers.¹⁴ Although one previously conducted study found that instructions that stressed the speed of the upper extremity while performing reaching tasks after stroke improved target accuracy and eventually resulted in a smoother movement.¹¹

It is a possibility that instructions that motivate and encourage the speed of a task might also result in better strategies of movements as well as increase the intensity of practice. Instinctively, the researchers in our current study were not able to observe any decrease in the quality of the movement or professed safety of the exercise or succeeding exercises with the increased intensity of practice. One limitation of this study was that the control group which was the non-specific instruction group did not receive a randomly ordered intervention, that was the task-oriented instruction. Future researchers are recommended to examine the effects of goal and task-oriented instructions over an entire therapy session or whole admissions might give us further evidence about the effects of task-oriented instructions on the intensity of practice and clinical outcomes in rehabilitating a stroke patient. It has been well established in the recent literature that longer therapy doses are a must to maximize the outcomes of the activity after the spell of the stroke, nonetheless, large doses of the therapy are not being rightly achieved in the clinical practice. Our current study demonstrates that stroke patients can significantly accomplish the intensities of practice when given task-oriented instructions. This, healthcare providers, can employ task-oriented instructions to help stroke survivors increase their dosages of practice in stroke rehabilitation plans. An already known fact is that after the spell of a stroke, patients who

perform a larger amount of task-specific practice tend to achieve better outcomes. Despite this fact, many stroke survivors who are undergoing stroke rehabilitation plans still do not achieve a higher rate of repetitions of their exercises.¹⁴ Our current study adds authentic data on that task-oriented instructions can result in a significant increase in the rate of repetitions of exercise. An instruction which is directed towards a task of performing a specific number of repetitions, performing them as fast as possible, and then targeting for personal best increases the number of repetitions more effectively and efficiently than when only a certain target number of repetitions are involved.

CONCLUSION

Our study concludes that task-oriented instructions help to increase the intensity of practice in stroke rehabilitation when compared with non-specific instructions. This study also concludes that task-oriented instructions ultimately result in a large increase in the rate of repetitions for an exercise when compared with non-specific instructions.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

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Authors' contributions: All authors read and approved the final manuscript.

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