



THE EFFICACY OF GRADED REPETITIVE ARM SUPPLEMENTARY PROGRAM IN IMPROVING THE MOTOR FUNCTION OF ARM AND HAND IN POST STROKE CASES

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ABSTRACT **Objective:** The objective of the study was to find out the efficacy of Graded Repetitive Arm Supplementary Program in improving the motor function of upper limb in Post stroke. **Study design:** Pre-post experimental control design. **Outcome measures:** Motor Assessment Scale (MAS) and Hand Grip Dynamometer **Results:** Wilcoxon signed rank test, Mann Whitney U test, Chi square test, paired t test and Un paired t test had been used to study the significance of study parameters Significance was assessed at 5% significance level. At the end of the study period percentage changes in scores of M A S for upper arm function post intervention in the experimental group was found to be significant ($p < 0.014$) where as in control group finding was not statistically significant ($p > 0.317$) Analysis between the group was found to be significant ($p < 0.029$). Grip strength was Assessed using hand grip dynamometer .Percentage change in post intervention in experimental group was found to be significant ($p < 0.009$) where as in control group finding was not statistically significant ($p > 0.169$) .Analysis between the group was found to be significant ($p < 0.05$). **Conclusion:** GRASP treatment is effective with its long term follow up. And it is the potential in improving the motor function of arm and hand in post stroke subjects. Being home based program it can be used as a self administerable program at home by the stroke subjects after discharge .Along with the other physical therapy techniques GRASP protocol can be administered as soon as possible to gain the maximum benefit.

KEYWORDS : Stroke, GRASP treatment, Motor function, Physical therapy techniques

INTRODUCTION

Stroke is the sudden loss of neurological function caused by an interruption of blood flow to the brain, clinically a variety of focal deficits are possible, including the changes in loss of consciousness and impairments of sensory, motor, cognitive, perceptual and language functions .motor deficits are characterized by paralysis (hemiplegia) or weakness (hemiparesis) typically on the side of the body opposite to the site of lesion.¹

WHO,s (1989) definition of stroke in adult, 16 years and older, was selected, and it is a rapidly developed clinical sign of focal disturbance of cerebral function of presumed vascular origin and of more than 24 hours duration³.

Stroke or apoplexy is the main cause of death and disability among older adults although most of the stroke survivors regain independent ambulation; many are having difficulty in performing activities of daily living especially their self-care and house hold duties⁴. Stroke occurs due to thrombus, emboli, hemorrhage with an incidence of 203 cases per lakh population in the age group more than 20 years with male to female ratio being 1:7 and 12% of stroke cases are seen in the age group below 40 years, it is also reported that 1.2% of total deaths are due to stroke in India and the cause of the disease depends up on the severity of the lesion.⁵

Hemiplegia is the term often used generically to refer to the wide variety of problem that result from stroke, the national institute of neurological disorder has defined C V A as any disorders in which an area of brain is transiently or permanently affected by ischemia or bleeding or in which one or more blood vessels of brain are primarily impaired by a pathological process .To be classified as a stroke or hemiplegia the focal neurological deficits must be present for at least 24 hours and take longer than 3 weeks to resolve when the duration of signs and symptoms is less than 24 hrs. the event is classified as Transient Ischemic Attack and is considered as a warning that stroke will occur in the future if left unattended¹³

Cerebral edema is the most common cause of death in acute stroke and is characteristics of large infarcts involving the M C A (Hachinski V, Norris J et al ; the acute stroke , 1985.)

Two main mechanisms results in stroke, Ischemic stroke – This is the most common type of stroke, accounting for almost 80% of all strokes. The most common cause of ischemic stroke in atherosclerosis, or gradual cholesterol deposition. It is caused by a clot or other blockage with in an artery leading to brain. (Www. Stroke center .com).

Intra cerebral hemorrhage is the abnormal bleeding in to extra vascular area of brain secondary to aneurysm or trauma which occurs at all stages .hemorrhage stroke makes about 12-24% of all strokes.¹⁴

Some hemorrhages develop inside areas of ischemia (hemorrhagic transformation) and it is unknown how many hemorrhages actually starts off as ischemic strokes¹⁶ the neurological deficits produced with systemic feature are global in nature with bilateral neurological deficit¹⁵

Common impairments after stroke are impaired motor functions, balance, sensory deficits, cognitive limitations, visual deficits, aphasia, depression.⁶ People who survived the initial stages of stroke generally show some improvement over time in their ability to move perform functional tasks. A variety of mechanisms have been suggested to explain recovery that includes neuro plasticity and adaptive changes (warlow et al)⁷.

According to statistical data from heart and stroke foundation of Canada (2003), about 40% of all the people who have had a stroke are forced to live with a moderate to severe impairment, and major part of neurological recovery takes place with in the first 1 to 3 months following stroke, while only minor changes are seen between 3 months and one year post stroke.

Early recovery is generally thought to be the result of resolution of local vascular and metabolic factors .thus the reduction of edema, absorption of damaged tissue and improved local circulation allows intact neurons that were previously inhibited to regain function. C N S plasticity is thought to account for continuing recovery. The relative involvement of the arm and leg varies depending up on the anatomical site of lesion but in the majority of cases arm is more affected than leg. furthermore the return of walking can be achieved with only moderate recovery of motor control in leg but functional use of the hand requires a high degree of fine motor control due to this combination of anatomical factors and the unique functional demands of the hand restoration of upper extremity function after stroke is often much less satisfactory than leg function.⁸

More intensive physiotherapy input was associated with a reduction in the combined poor outcome of death or deterioration and may enhance the rate of recovery.²⁵ Intensive rehabilitation is expensive however and many managed care organization provide their clients with a limited number of therapy sessions before they stop financing rehabilitation. Further, more the limited number of sessions can cover a wide range of services and a large number of skills. Therefore, repetitive practice may not be provided at appropriate frequencies for motor learning to occur. As a result, therapy intended to improve upper extremity function following a stroke, which may involve more repetitive practice of skills.

These findings indicate that considerable time during the day when the individuals could engage in therapeutic activity outside of standard therapy time .A possible way to engage individuals in activity during this time is by developing a self-administered homework based

exercise program that is supplemental what is received in therapy. Self-administered exercise programs have been successfully prescribed for the upper limb for the home setting with favorable results for improved upper limb function in post stroke cases 37,38.

But there is a less literature available on the efficacy of GRASP in post stroke cases in the various clinical aspects and also there is no literature search to prove the effectiveness of the long term effects of GRASP in post-acute stroke subjects

Hence there is a need to determine the long term effectiveness of the graded repetitive arm supplementary program in improving the motor function of the arm and hand in post stroke subjects .

Methodology
MATERIALS AND METHODS

Source Of Data:

Pappareddypalya, Nagarbhavi, Bangalore

Method Of Collection Of Data:

- Population : Stroke patients
- Sample : Stroke subjects with hemiplegia
- Sample design : Purposive sampling
- Study design : Pre and post experimental control design
- Sample size : 30 subjects.
- Duration of the study: 12 Weeks.

Inclusion Criteria:

1. Age between 40- 60 years.
2. Subjects with stroke less than one month.
3. Subjects of both the genders.
4. Subjects diagnosed as strokes confirmed by CT or MRI scan.
5. Subjects with palpable wrist extension of grade I muscle power of MRC.
6. Subjects who will be screening under fugl-meyer score.
7. Subjects with stroke having active shoulder shrugging.
8. Subjects with scores between 10- 57 under fuglmeyer score.

Exclusion Criteria:

1. Subjects with MMSE score less than 20.
2. Subjects with receptive aphasia
3. Subjects with unstable cardio vascular status.
4. Subjects with psychiatric illness like severe depression, poor motivation.
5. Subjects with the presence of significant upper limb musculo skeletal and any other neurological conditions other than stroke.
6. Subjects with visual impairments.
7. Non cooperative subjects.

Materials Used

1. Foot stool
2. Pillow
3. Stop watch,
4. Floor mat
5. Chair with armrests
6. Pitcher with water
7. Measuring cup
8. Ball 2.5 inches in diameter,
9. Adjustable table
10. Hand gripper
11. Thera putty
12. Tennis ball
13. Clothes pegs
14. Lego pieces
15. Hand towel
16. Plastic jar and lid
17. Paper clips
18. Bean bags
19. Target board
20. Stopwatch
21. Jellybeans
22. Rubber ball
23. Comb Spoon
24. Pen
25. 2 Teacups
26. Water
27. Cylindrical object like a jar
28. Table.

Parameters:

1. Motor Assessment Scale (MAS).
2. Hand Grip Dynamometer (HGD).

The duration of treatment was for one hour of prescribed exercises 7 days a week and can divide the exercises in to 2 to 30 minutes session for the duration of 3 months for the experimental group and for the control group it is for only ten minutes.

Procedure:

Informed consent was taken from the subject. Subjects were then screened for inclusion and exclusion criteria by doing a routine neurological examination.

Parameters- The upper arm function component & grip strength were measured by using M A S and Hand grip dynamometer, then the duration of stroke was noted as a pretest score for both the groups.

Subjects were assigned in to the any one of the 2 groups randomly as follows-

1. GROUP A - Experimental group (n=15).
2. GROUP B -Control group (n=15).

The experimental group received GRASP treatment and the control group only Conventional physiotherapy.

The group B was instructed to follow the conventional treatment which includes passive movements, sustained stretching, consistent range of motion exercises, positioning,

The group A subjects instructed to follow the treatment protocol as given in the books

After being practically demonstrated.

Duration-

one hour of prescribed exercises 7 days a week and can divide the exercises in to 2 to 30 minutes session for the duration of 3 months.

Daily and regular follow up was done for the duration of 12 weeks for both the groups and a post intervention upper arm function and hand grip strength is measured after 12 weeks.

Outcome Measures:

1. Upper Arm function component of Motor Assessment Scale for measuring upper arm function.
2. Hand Grip Dynamometer for measuring the grip strength.

DATA ANALYSIS AND RESULTS

Descriptive statistical analysis has been carried using software version 17 SPSS Base line data for demographic variables mean age of group A is 49.40 ± 4.17, group B is 50.00 ± 5.26.

	Group A	Group B	P-value
Number of samples	15	15	-
Age in years ; Mean ± SD	49.40±4.17	50.00±5.26	>0.732
Onset of treatment in days; Mean ± SD	13.20±3.21	14.53±3.74	>0.304
FMA; Mean ± SD	36.00±10.87	28.87±9.82	>0.074
Gender; No (%)			>0.690
Male	11 (73.3%)	10 (66.7%)	
Female	4 (26.7%)	5 (33.3%)	
Side involvement;			>0.713
Right	9(60.0%)	8(53.3%)	
Left	6(40.0%)	7(46.7%)	
Type of stroke;No (%)			>0.413
Hemorrhagic	6(40.0%)	10(66.7%)	
Ischemic.	9(60.0%)	5(33.3%)	

Hence the samples are age matched with P = 0.73, which is not statistically.

Significant.

Gender distribution of subjects studied between the groups is not statistically significant with P value Of >0.69.

Subject distribution in the 2 groups based on the side involved: The difference between the groups is not statistically significant for the side involved

With the P value > 0.713.

The mean onset of treatment after stroke occurrence in Group A is 13.20±3.21 and in Group B is 14.53±3.74 with P value of >0.304 which is not statistically significant.

Subject distribution in the two groups based on the type of stroke .The difference between the groups is not statistically significant for the type of stroke with the P value >0.413.

The mean score of fuglmeyer is 36.00 ± 10.87 in Group A and in Group B is 28.87 ± 9.82 with P value of >0.074 which is not statistically significant

Table 2: Base Line Data For Outcome Variables

Base line data for outcome variables			
Variables	Group A	Group B	P Value
M A S	1.27 ± 0.80	0.80 ± 0.77	>0.137
H G D	1.20± 0.77	0.80 ± 0.62	>0.130

Base line means score of M A S in group A is 1.27 ± 0.80 and in group B it is 0.80 ± 0.77 which is statistically not significant with the P value of >0.137. Base line score for H G D in group A is 1.20 ± 0.77 and in group B is 1.90 ± 1.28 which is statistically not significant with the P value <0.009.

Motor Assessment Scale			
Group	Pretest score	Post test score	P Value
Group A	1.27 ± 0.80	1.67 ± 0.98	<0.014.
Group B	0.80 ± 0.77	0.87 ± 0.74	>0.317.

In group A pretest score MAS is 1.27 ± 0.80 and post score is 1.67 ± 0.98
In group B pretest score is 0.80 ± 0.77 and post test score is 0.87 ± 0.74.

Hand grip dynamometer			
Group	Pretest score	Post test score	P Value
Group A	1.2 ± 0.77	1.9 ± 1.28	<0.009.
Group B	0.80 ± 0.62	1.03 ± 1.02	>0.169.

In group A pretest score H G D is 1.2 ± 0.77 and post score is 1.9 ± 1.2
In group B pretest score is 0.80 ± 0.62 and post test score is 1.03 ± 1.02.

Difference of gain in improvement			
Variables	Experimental	Control	P Value
M A S	1.67 ± 0.99	0.86 ± 0.74	< 0.029
H G D	1.90 ± 1.28	1.03 ± 1.02	< 0.05

The mean difference of gain between the pre and post test score of M A S in group A is 1.67 ± 0.97 and in group B is 0.86 ± 0.74 with the P value of <0.29 which is statistically significant. The mean difference of gain in between the pre and posttest core of H G D in group A is 1.90 ± 1.28 and group B is 1.03 ± 1.021 with the P value of <0.05 which is Statistically significant .

DISCUSSION

This study is intended to find out the efficacy of G R A S P protocol, in order to improve the motor function of arm and hand in post stroke subjects. So that based on this kind of studies.

The most significant finding in this study was that the administration of GRASP treatment improve the motor function of arm and hand during the 12 weeks study period self-administered exercise program requiring minimal therapist involvement .Feasible for subjects with no wrist or hand movement outcome measure is very applicable to real life situations.

1. In the experimental group the pretest score for MAS was 1.27± 0.8 which is increased significantly to 1.67 ± 0.9 with the P value <0.014.
2. In the experimental group the pretest score for HGD was 1.2 ± 0.77 which is increased significantly to 1.9 ± 1.28 with the P value <0.009.

CONCLUSION

Though there is less supporting evidence from the literature, for the home based practice ; the outcomes of the study with significant statistical changes lead us to the conclusion that the effects of GRASP treatment helps in reducing the motor deficits of arm and hand.

As the results show a significant difference between the groups, the experimental hypothesis is accepted which could be stated as the GRASP treatment is effective in improving the motor function of arm and hand for the long duration.

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