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EFFECT OF MOTOR IMAGERY TECHNIQUE ON BALANCE AND COGNITION IN GERIATRIC POPULATION

Neurophysiotherapy

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ABSTRACT

Context: As the age advances impairments related to balance are commoner which can be multifactorial. Motor Imagery is useful in varities of neurological disorders. **Aims:** To evaluate effect of motor imagery technique on balance and cognition in geriatric population. **Methods and materials:** 50 Participants were selected as per selection criteria. and divided into two groups; multimodal exercise programme and MI given for 3 days/week for 4 weeks and in control group only multimodal exercise programme was administered. Outcome measures were BBS and MMSE. **Results:** It suggested that there was significant improvement in balance and cognition in both the groups. **Conclusion:** Hence motor imagery is proved to be effective to improve balance and cognition and is equally effective as control group intervention.

KEYWORDS

Motor Imagery, Balance, Geriatric, Multimodal exercise.

1. INTRODUCTION

Motor Imagery (MI) is the mental process in that person produces action without execution. It is type of cognitive rehearsal.[1] In other words, Motor imagery is a process which includes cognitive-perceptive aspects and with the absence of any kind of peripheral (muscular) activity. There are two forms of motor imagery: visual and kinaesthetic.[2]

Use of motor imagery in following fields have been reported: Education, Medicine, Music, Psychology and Sports.[3]

Motor imagery can be regarded as mental practice a practice method in which performance on the task is imagined or visualized without overt physical practice.[9]

Failure to regain balance after loss of stability results in fall[10]. The risks and causes of falls are multifactorial.[11] Prevalence of falls among older adults varies from 14% to 53%.[12]

Cognition is the act or process of knowing, including awareness, reasoning, judgment, intuition and memory.[9] The interaction between cognition and postural control is well established.[10]

The rehabilitation process includes problems and need identification, relating them to modifiable and limiting factors, to target problems and target mediators, selection of appropriate measures, to plan out and implement intervention and assess effect of intervention.[13], [14]

With the use of Motor Imagery there is direct association of aspects of motor learning and there by cognitive aspects. As the age advances changes in ability to learn is also evident.[15] BBS -Berg Balance Scale is an objective measure of static and dynamic balance abilities, that can be used to assess balance.[16]

1.2 Need Of The Study:

Several studies relate association of physical activity and cognitive aspects closely, use of motor imagery in older age group is quite questionable as with advancing age aspects related to motor learning, cognition differ. So this study aimed to know effect of motor imagery in older individuals. And with most traditional approaches cognitive aspects are under-looked.

2.AIM AND OBJECTIVES:

2.1.1 AIM:

To evaluate effect of motor imagery technique on balance and cognition in geriatric population.

2.1.2 OBJECTIVES:

To evaluate effect of motor imagery technique on balance.
To evaluate effect of motor imagery technique on cognition.

3. METHODOLOGY

- Study design: Interventional
- Tudy setting: Old age homes of Rajkot
- Sampling technique: Convenient
- Sample and sample size: 50
- Study duration: 6 months
- Selection criteria:

Inclusion criteria:

- Young old age:65-74 years[17]
- MIQ-RS questionnaire- total 14 questions, 7 point scoring for each, minimum score of 4 or more for each[16]
- Clinical balance assessment- type 3 dizziness[10,18]

Exclusion criteria:

- Disorders related to visual system
- Disorders related to Peripheral vestibular system
- Those who are medically not allowed to engage in physical activities

3.4 Procedure

The study proposal was approved by the Ethics Committee, School of Physiotherapy, RK University(ECR/259/Indt/GJ2016) and CTRI registration was done. (CTRI/2021/01/030312).

Fifty patients were enrolled according to selection criteria. Informed consent was taken from all the patients. The participants then were allocated into two groups.

Interventional group- Group A and control group- Group B. Participants' blinding was done.

Group A was given multimodal exercise programme and Motor Imagery (Figure 3.3) for 3 days/week for 4 weeks consecutively whereas Group B was given only multimodal exercise programme for 3 days/week for 4 weeks consecutively.

Multimodal exercise programme[19-21]:

Includes, strengthening exercise of quadriceps, hamstring, glutes, abdominal muscles, Stretching Exercise of hamstring, hip flexor, gluteus Maximus and Para spinal, Coordination and balance exercise.

Motor Imagery protocol[1–3,22]:

Form of Motor imagery: Motor imagery in first person kinaesthetic and visual combined form using visual, auditory cues by following PETTLEP model: physical, environment, task, timing, learning, emotion, perspective.

4. RESULTS

- Descriptive statistics were used to describe sample characteristics. The level of significance was set at 0.05.
- Mean age in Group A is 69.20 years, Control group, Group B is 68.52 years.

- SPSS version 21.0 for windows was used for statistical analysis.
- Intragroup analysis was done using Wilcoxon signed-rank test for BBS and MMSE. And intergroup analysis was made using Mann-Whitney U test. (Table 4.1)

Table 4.1 Statistical analysis

Intragroup analysis						
Group	Outcome		Mean	SD	Z-value	p-value
Group A	BBS	Pre	43.08	7.04	-4.394	0.0000
		Post	47.44	6.16		
Group A	MMSE	Pre	24	2.78	-4.360	0.0000
		Post	25.76	2.35		
Group B	BBS	Pre	46.52	4.20	-4.467	0.0000
		Post	50.60	3.23		
Group B	MMSE	Pre	23.84	2.51	-4.078	0.0000
		Post	25.44	2.10		
Intergroup analysis						
	Outcome	Group	Mean	Z-value	U-value	p-value
	BBS	Group A	47.44	-1.675	226.500	0.094
		Group B	50.60			
	MMSE	Group A	25.76	-0.499	287.000	0.618
		Group B	25.44			

4. DISCUSSION

Motor imagery is kind of mental practice which aims to enhance performance as well as learning.4,5 Nicholson V stated that motor imagery technique can be used with conventional physiotherapy care in older adults to improve balance and mobility, possible mechanism regarding how imagery improves motor task relates with production and refinement of internal representation of motor task in older adults without neurological diseases.[25] Motor imagery involves pathways similar those are used for motor control while actual execution of movement and there is activation of similar areas of brain on fMRI.1-[3,8,11,25-28]

Cornelia concluded that motor imagery or mental practice promotes cognitive adaptation process during the task of motor learning and there by improves mental representation of task and internal representation better than when done only physical practice. There is a cognitive-motor hypothesis which describes that mental practice is better to improve cognitive tasks rather than motor tasks. On contrary to that this study and other studies show effect on both cognitive and motor tasks. In sum, more cognition laden a task the more it is suitable to implement mental practice.[29]

Also the timing of motor imagery is under question by all previous studies. There are various constraints which affect motor imagery: environmental, content of motor imagery, individual strategy and characteristics, motor skill characteristics.

On contrary, the control group, Group B which was given only exercise showed to improve cognition in this age group individuals. Jian-Ping Hu concluded that participation in exercise program can improve aging patients' cognitive functions but that again depends on type of exercise- aerobic exercise has been proved to improve cognition but mechanisms related to other type of exercises is not proved.[30]

Motor imagery known as explicit motor imagery is an attractive measure of modern neurorehabilitation and targets many aspects simultaneously decreases burden of physical activity partly especially in those who are unable or not allowed to take part in physical activities, in many acute cases where role of exercise whether to start or not is under question. Efficacy in elderly group has been put to a question with many previous researches. Protocols of imagery is also unclear even after numerous researches and whether gender affects on MI or not is not known. Further large scale researches are required to answer all these.

6. CONCLUSION

The study concludes that motor imagery technique improves balance and cognition in geriatric population and it is as effective as control group intervention.

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