International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Effect of Brain Gym Exercises on Gait Parameters and Quality of Life in Elderly Population

Dr. Krishna R Pandya[1], Dr. Vaishali Suthar[2], Dr. Naisargi Shukla[3]

[1]Assistant Professor, Physiotherapy in Neuroscience, Arush Physiotherapy College - Ahmedabad
[2] Assistant Professor, Physiotherapy in Neuroscience, Ahmedabad Institute of Medical and Sciences - Ahmedabad
[3] Practicing Physiotherapy, Physiotherapy in Community Rehabilitation, HCC Hospital - Ahmedabad

Abstract
Brain gym exercises consist of series of movements that purposefully activates brain promotes neurological repair and facilitate whole brain learning in elderly population. This research aims to find the effect of Brain gym interventions in improving gait parameters like stride length, cadence, gait velocity and quality of life in the elderly. Tis research is and experimental with pre and post-test group design. The sample determination based on inclusion criteria. The sample size is 26, divided into two groups (13 in each), group A receives brain gym exercises and group B convention exercises. The session will be conducted 3 times a week for 2 weeks. It concluded that cadence and stride length have shown more improvement with brain gym exercises in elderly population and there was subjective improvement in quality of life in elderly population for both the group.

Keywords: Brain gym, quality of life, gait parameters

Introduction

- Falls represent the most common mechanism of injury and the leading cause of death from injury, in people older than age 65 years.[1] With the aging process, quality of life (QOL) among the elderly population may gradually decrease. Good QOL for the elderly can be defined as feeling better, properly carrying out their basic activities of daily living (ADLs), and living independently. Therefore, QOL becomes a target for programs aimed at assisting the elderly.[5] Normal gait and balance requires freely moving joints; muscles contracting at the right time with the appropriate strength; and accurate visual, vibratory, and proprioceptive input. Brain Gym is an academic kinesiological program that is promoted and applied with a consistent learning purpose and is invented by Paul and Gail Dennison, in the 1970s.
- Laterality, the synchronization between the brain's right and left hemispheres, which is considered important for reading, writing, hearing, communicating and being able to walk and think.
- Focusing, the ability to process information in the brain, which is connected to perception and lack in attention/hyperactivity.
- The final section, centering, the top and bottom brain parts organized as necessary to combine rational thought with emotion. The most effective way to activate brain is to integrate the right and

left-brain functions by combining kinesthetic and tactile learning, strategies with visual and auditory exercises. Brain exercise leads to sensory integrity, motor learning and brain-body connection.

- It has been suggested that higher level of fitness through increased physical activity might have a positive effect on neuropathologic substrates as well as it might lead to a decreased whole brain and medial temporal lobe atrophy in older adults.
- Intervention of physiotherapy in elderly patients leads to improve sleep, quality of life, reduce depression and stress and it has significant effects on the cognition and psychological perception.[6]
- Brain Gym exercises consists of total 26 components however studies have showed improvement in following 10 components for balance and attention.
- The exercises included were:- 1) Cross Crawl,2) Belly Breathing, 3) Brain Buttons, 4) Positive Points, 5) Thinking 'X', 6) Lazy Eights, 7) Energizer, 8) Energy Yawns, 9) Thinking Caps and 10) The Elephant.

1. Materials and Methodology

INCLUSION CRITERIA:	EXCLUSION CRITERIA:
Age 65 to 84 years	History of any neurological and musculoskeletal impairment, balance impairment like CVS, Parkinson disease and fractures.
Gender—male and female both	Unstable cardio-respiratory condition that may affects training procedure.
MMSE score ≥ 24	Patient diagnosed with severe visual and auditory impairment.
BBS score ≥ 41	Patient walking with external aids.
Subjects willing to participate in the study.	Cognitive impaired subjects.

MATERIAL USED IN THE STUDY:

1. Consent form
2. Assessment sheet
3. Older People Quality Of Life scale
2. Measure tap
3. Wooden Chair without armrest
4. Stop watch
5. Pen/pencil
6. Kumkum Powder

OUTCOME MEASURES:

1. Older People's Quality Of Life Scale (OPQOL) (Gujarati version)
2. GAIT PARAMETERS – Stride length, Cadence, Gait velocity.

GAIT PARAMETERS: For evaluation of walking;

1. Stride length: Subject position: standing to walking

Method: subject immersing both the feet in plate containing kumkum powder, and then ask the subject to relax and walk on the floor for 1 minute, measured between two successive placements of the same foot (heel to heel) with use of measure tape (in meters).

2. Cadence: total number of steps count in 1 minute with use of stop watch.

3. Gait velocity:

Method: calculate gait velocity using value of stride length and cadence, with this formula:

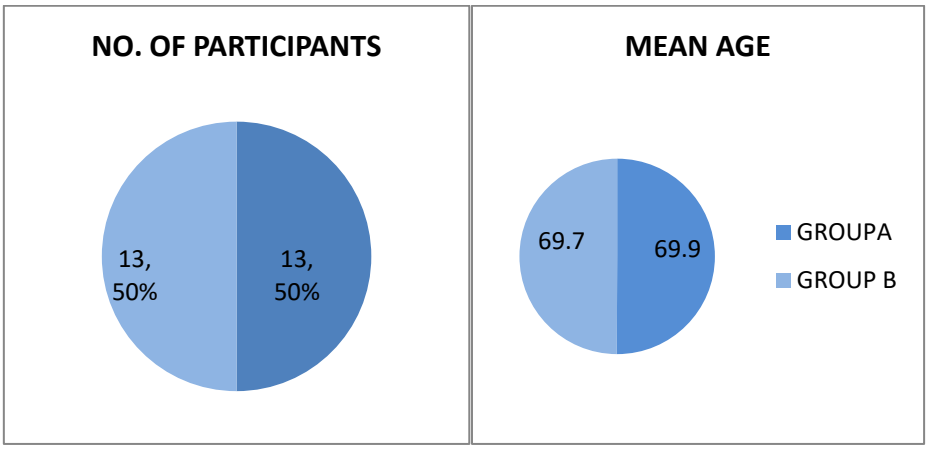
Speed (m/s) = stride length (m) × cadence (steps/min) / 120

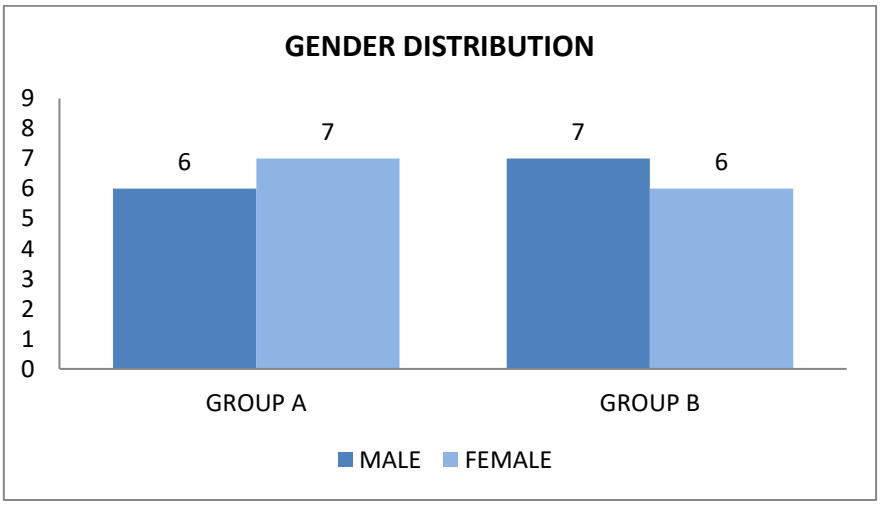
4. OLDER PEOPLE QUALITY OF LIFE SCALE (OPQOL) (Gujarati version):

The sessions were 3 times a week for 2 weeks (total 6 sessions), each session of 20 minutes. In first day of training subjects were demonstrated, and subjects were instructed to perform the procedure. On second day subjects were instructed to perform the procedure. Each step pattern was repeated 10 times to ensure that the person could complete the pattern.

7. Result:

The present study was done to find The Effects of Brain Gym Exercises on gait parameters and Quality of Life in Older People. Gait ability through Gait parameters and quality of life in older people through Older People Quality Of Life (OPQOL) scale were measured before and after the intervention.





Within group analysis: Group A and Group B

Outcome	Group	Pre (Mean ± SD)	Post (Mean ± SD)		t-value/ z-value	p-value
Stride Length	A	0.84± 0.16	0.95 ±0.19		1.85 (z-value)	0.64
	B	0.78 ±0.14	0.87± 0.22		0.147 (t-value)	1.55
Cadence	A	87.5 ±13.2	93.3 ±12.8		4.06(t-value)	0.002
	B	98.5 ±10.04	99.8±14.17		0.84(t-value)	0.40
Gait Velocity	A	0.61 ±0.16	0.74 ±0.24		2.80(t-value)	0.016
	B	0.64 ±0.14	0.73 ±0.22		1.78(t-value)	0.10
OPQOL	A	140.6 ±13.36	140.8±12.60		0.37(t-value)	0.71
	B	146.6±13.14	148.2±12.06		1.79(t-value)	0.09

Between group analysis: Group A and Group B

Outcome	Group	Mean difference	SD	t-value/ u-value	p-value
Stride length	A	0.17	0.1	3.9(t-value)	0.001
	B	0.9	0.2		
Cadence	A	5.7	5.1	2.145(t-value)	0.042
	B	1.3	5.4		
Gait Velocity	A	0.13	0.17	0.686(t-value)	0.49
	B	0.09	0.18		
OPQOL	A	0.15	1.49	62.50 (u-value)	0.198
	B	1.53	3.09		

8. Conclusion

The present study concluded that brain gym exercises and conventional treatment was effective in improving gait parameters. However, cadence and stride length have shown more improvement with brain gym exercises in elderly population. There was subjective improvement in quality of life in elderly population for both the group.

References

1. Thachil A, Thomas L. Effect of Square-Stepping Exercise in Improving Lower Extremity Strength, Cadence and Confidence among Female Geriatric Population.
2. Lee A, Lee KW, Khang P. Preventing falls in the geriatric population. The Permanente Journal. 2013;17(4):37.
3. Gait and Balance Disorders in Older Adults Mishra N, Mishra AK, Bidija M. A study on correlation between depression, fear of fall and quality of life in elderly individuals. Int J Res Med Sci. 2017 Apr;5(4):1456.

4. de Oliveira LD, Souza EC, Rodrigues RA, Fett CA, Piva AB. The effects of physical activity on anxiety, depression, and quality of life in elderly people living in the community. Trends in psychiatry and psychotherapy. 2019 Feb 4;41:36-42.
5. Siroya VV, Naqvi WM, Kulkarni CA. Importance of Brain gym as exercise in physiotherapy and rehabilitation. Int J Res Pharm Sci. 2020;11:1386-9.
6. Effect of Brain Gym® Exercises on Balance and Risk of fall in Patients with Diabetic Neuropathy
7. Andi P, Dharma KK, Purwanto E, Firdaus R, Loriana R. The intervention of Brain Gym in increasing the quality of life on the elderly. Asian Community Health Nursing Research. 2019 Feb 3:28-.
2. Kulkarni C, Khandale SR. Effect of brain gym exercises on the attention span in young adults. International Journal for Advance Research and Development. 2019;4(4):71-5.
3. Effendy E, Prasanty N, Utami N. The effects of brain gym on quality of sleep, anxiety in elderly at nursing home care case Medan. Open access macedonian journal of medical sciences. 2019 Aug 8;7(16):2595.
4. Patterson L. *Brain Gym®-an academic critique* (Doctoral dissertation, Ph. D,. Thesis. University of Southampton [Online].[Accessed 5 September 2018]. Available at: http://blog. soton. ac. uk/edpsych/files/2015/08/Brain-Gym-Dec-2012-Lindsay-Patterson. pdf).
5. Hafez R. Effect of Brain Gym on manipulating skills and balance for beginners in rhythmic gymnastics. Science, Movement, and Health. 2017 Jan 1;17(1):66-72.
6. Ocampo Jr JM, Varela LP, Ocampo LV. Effectiveness of brain gym activities in enhancing writing performance of grade I pupils. Sosiohumanika. 2017 Dec 28;10(2):179-90.
7. Nejati V, Shirinbayan P, Akbari Kamrani A, Foroughan M, Taheri P, Sheikhvatan M. Quality of life in elderly people in Kashan, Iran. Middle East Journal of Age and Ageing. 2008 Jan 1;5(2):21-5.
8. AGHA MT, Tavafian SS, Zare S. Health related quality of life in elderly people living in Bandar Abbas, Iran: a population-based study.
9. Khan MN, Mondal MN, Hoque N, Islam MS, Shahiduzzaman MD. A study on quality of life of elderly population in Bangladesh. American Journal of Health Research. 2014 Jul;2(4):152-7.
10. Canbaz S, SÜNTER AT, Dabak S, PEKŞEN Y. The prevalence of chronic diseases and quality of life in elderly people in Samsun. Turkish Journal of Medical Sciences. 2003;33(5):335-40.
11. Bowling A, Hankins M, Windle G, Bilotta C, Grant R. A short measure of quality of life in older age: The performance of the brief Older People's Quality of Life questionnaire (OPQOL-brief). Archives of gerontology and geriatrics. 2013 Jan 1;56(1):181-7.
12. Bowling A. The psychometric properties of the older people's quality of life questionnaire, compared with the CASP-19 and the WHOQOL-OLD. Current gerontology and geriatrics research. 2009 Oct;2009.
13. Safaan N, Abd El-Aal B, Emam H, Nady S. Quality of life of Elderly People with Hearing Impairment. Tanta Scientific Nursing Journal. 2021;20(2):156-79.
14. Situation analysis of elderly in india , central statistics office ministry of statistics and programme implementation government 9f india – june 2011.
15. Chapter 1, introduction of geriatric physiotherapy, principal of geriatric physiotherapy, narinder kaur multani (2007) isbn : 81-8448-105-5.
16. Kortebein p rehabilitation for hospital associated deconditioning.
17. Coletta em : Care of elderly patient with lower limb amputation j am board fam pract.

18. Marjm'e h woollacott, pei-fang tang. Balance control during walking in the older adults : Research and its implications physical therapy june 1997; 77 (6): 646-660.
19. Beauchet o, allali g, sekhon h, verghese j, guilain s, steinmetz jp, kressig rw, barden jm, szturm t, launay cp, grenier s. Guidelines for assessment of gait and reference values for spatiotemporal gait parameters in older adults: The biomathics and canadian gait consortiums initiative. Frontiers in human neuroscience. 2017 aug 3;11:353.
20. Osoba my, rao ak, agrawal sk, lalwani ak. Balance and gait in the elderly: A contemporary review. Laryngoscope investigative otolaryngology. 2019 feb;4(1):143-53.
21. Suzanne g leveilli rn chronic musculoskeletal pain and occurrence of falls in an older population ,jama 2009:302(20):2214-2221.
22. -thaut cp. Rhythmic auditory stimulation to reduce falls in healthy elderly and patients with parkinson's disease: A randomized control trial (doctoral dissertation, colorado state university).
23. Hafez R. Effect of Brain Gym on manipulating skills and balance for beginners in rhythmic gymnastics. Science, Movement, and Health. 2017 Jan 1;17(1):66-72.
24. Klingman RE, Liaos MS, Hardin KM. The effect of subtalar joint posting on patellar glide position in subjects with excessive rearfoot overpronation. J orthop sports phys ther, 1997; 25(3): 185-191.
25. Crocker T, Forster A, Young J, et al. Physical rehabilitation for older people in long-term care. Cochrane Database Syst Rev 2013;2:CD004294
26. Cancela Carral JM, Pallin E, Orbegozo A, Ayán Pérez C. Effects of three different chair-based exercise programs on people older than 80 years. Rejuvenation Res 2017;20:411-9.
27. Exmoorjane. Brain gym simple exercises for better mind and body. Health, natural health - therapies, parenting, psychology. Published on July 5,2011. Sourcehttps:// brutallyfrank.wordpress.com/2011/07/05/brain-gym-simple-exercises fora- better-mind-and-body/