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Effect of Brain Gym® Exercises on Balance and Risk of fall in Patients with Diabetic Neuropathy

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ABSTRACT

Background: Wider stance and significant slower speed of walking is characteristic feature diabetic individuals. These gait abnormalities of diabetic patients are 15 times more likely to report experiencing a fall related injury during walking.
Objectives: To study the effect of Brain Gym® exercises on balance & risk of fall in patients with diabetic neuropathy.
Method: in this study, 15 individuals between 40-90 years of age, an inclusion criterion was diagnosed diabetic neuropathy and who have positive findings in Michigan Neuropathy screening instrument scale (MNSI). Subjects scoring more than 24 on Mini Mental State Examination scale. An exclusion criterion was subjects with diseases like Parkinson's disease, Alzheimer's disease. Subjects with balance issues due to previous injuries. Patients with severe impairment of walking or balance. Brain Gym® exercises were given to them as intervention for 2 weeks thrice in a week 30 min and balance and risk of fall were assessed on first and last day of their program. Result: This study signified that both balance (p-value <0.0001) and risk of fall was statistically and clinically significant (p-value <0.0001).
Conclusion: There is significant effect of Brain Gym® exercises on balance and risk of fall in patients with diabetic neuropathy.

Keywords: Brain Gym® exercises, Diabetic Peripheral Neuropathy, Balance, Risk of fall

INTRODUCTION

Wider stance and significant slower speed of walking is characteristic feature diabetic individuals. These gait abnormalities of diabetic patients are 15 times more likely to report experiencing a fall related injury during walking. [1]

There are some evidences that long term diabetes affects central nervous system, peripheral nervous system mainly manifest in the clinical impact of diabetes. Diabetic neuropathy causes substantial morbidity and increases mortality. It is diagnosed on the basis of signs and symptoms, and after ruling out other cause of neuropathy. Depending on criteria used for diagnosis, it affects between 50 and 90% patients with diabetes, and of these, 15-30% will have painful diabetic neuropathy (PDN). Like retinopathy, neuropathy occurs secondary to metabolic disturbance, and prevalence is related to the duration of diabetes and degree of metabolic control. [2]

Brain Gym movements, exercises, or activities are the original 26 Brain Gym movements, sometimes abbreviated as the 26. The movements which are naturally done during the first years of life when learning coordinated the eyes, ears, hands and whole body are recalled by these activities. The principle behind Brain Gym international is that moving with intention leads to optimal learning. These exercises are really simple and can be performed by people of all age groups. Brain gym exercises are mostly actively practiced by

children and young adults. But currently, even adults and aged people too practice these exercises. There are various benefits associated with brain gym exercises. [3]

The Brain Gym exercises works on the principle of re-patterning, the re-patterning decreases the concentration of connections going to only one hemisphere and increase the connection between the right and left hemispheres are integrated, to facilitate learning. However, the exact mechanism or physiologies associated with Brain Gym Exercises are not clearly understood as there is limited literature available. [1]

Brain gym exercises consist of a series of movements that purportedly activate the brain, promote neurological repatterning, and facilitate whole-brain learning (Dennison & Dennison, 1994). The program is based on the notion that learning problems are caused when different sections of the brain and body do not work in a coordinated manner, thereby blocking an individual's ability to learn (Dennison & Dennison, 1994). To overcome this learning block, the program recommends a variety of simple movements that are intended to improve the integration of specific brain functions with body movements. In fact, Brain Gym is described as a process for re-educating the mind and body that would result in learning any skill more efficiently and easily. [4]

Brain gym represents improvement in attention span, discipline, attitude, general performance and behavior, comprehension and understanding, concentration, focus, eye-hand co-ordination, fine motor skills, following directions, mathematics and computation, reading and writing abilities, self confidence, self esteem, short and long term memory, speech, spelling. [5]

These movements are beneficial for people of all ages, ability and walks of life. A brain gym movement has been shown to provide improved blood flow and balance, better oxygenation and healthier physiology. [5]

METHODOLOGY

This study has been designed to find out effect of brain gym exercises on balance and gait in diabetic neuropathy. Pre Post Experimental study was carried out by doing purposive (convenient) sampling between the age group 40-90years. An inclusion criterion was diagnosed diabetic neuropathy and who have positive findings in Michigan Neuropathy screening instrument scale (MNSI). Subjects scoring more than 24 on Mini Mental State Examination scale. An exclusion criterion was subjects with diseases like Parkinson's disease, Alzheimer's disease. Subjects with balance issues due to previous injuries. Patients with severe impairment of walking or balance. Materials used were Yard stick, stool / stepper, chair, stopwatch.

Procedure

The approval was obtained from the institution head and ethical committee before starting the procedure and individual consent was taken.

Screening

In order to obtain 20 samples 50 subjects has been screened. During screening 50 samples underwent Michigan Neuropathy screening instrument scale (MNSI). The cut off in Michigan Neuropathy screening instrument scale (MNSI) section-A i.e. History was ≥7 and ≥2.5 in section-B i.e. in assessment were included in study. This was followed by assessment of balance using Berg Balance Scale and risk of fall using Fall Efficacy Scale I, subjects who fulfilled inclusion criteria.

Treatment

Brain Gym Exercises®

Intervention of 2 weeks with Brain Gym Exercises® was given thrice in a day for 30 minutes. The exercises included were:-

1) Cross Crawl- [6]

The participant alternately moves one arm and its opposite leg and the other arm and its opposite leg, as in a march-past. This was repeated for 3 minutes.

2) Belly Breathing- [6]

Inhale through the nose after cleansing the lungs initially with 1 long exhalation, released in short puffs through pursed lips (as though keeping a feather afloat). Thereafter, breathe out through the nose. Rest the hands on the lower abdomen, rising on inhalation and falling on exhalation. Inhale to a count of three, hold for three, exhale for three and hold for three. Repeat. When doing activities like lifting, kicking, or pushing, remembers to exhale on the exertion. This was repeated for 4 times.

3) Brain Buttons- [6]

The participant stimulates these points for twenty to thirty seconds, or until any tenderness is released. The Brain Buttons may be tender initially; the tenderness subsides over a few days to a week. Then, even holding the points will activate them.

4) Positive Points- [6]

The participant thinks of something he would like to remember, such as the spelling of a word, or concentrates on a potentially stress-producing situation, such as a test, interview, etc. The participant keeps his eyes closed and allows himself to experience the image, or to experience the associated tension and then its release.

5) Thinking 'X'– [7]

Participant closes his eyes and thinks of the letter X and visualizes it. Subject will notice X-like organization and symmetry in your body as each side of your hip co-ordinates with the shoulders.

6) Lazy Eights- [7]

Extend your arm straight out in front of you, equal to your shoulder level with your thumb pointing towards ceiling, slowly and smoothly trace shape of large figure 8, focus your eyes on the thumb.

7) Energizer- [7]

Drop your head forward and relax your shoulders. While breathing, close your eyes and easily roll your head from side to side. Try to make small circles while you breathe deeply. This was repeated 5 times.

8) Energy Yawns- [7]

As subject starts to yawn, using his fingertips of both the hands, press lightly the tight spots near cheeks where cheeks cover the upper and lower molar, makes a relaxed and deep yawning sound. This was repeated for 5 times.

9) Thinking Caps- [7]

Using one hand at the top of each ear, try to unroll the curved parts gently of the outer edges of both ears together. Continue till subject reaches the bottom of the ears. Repeat it for 4 times.

10) The Elephant- [7]

Subject will place left ear on your left shoulder and will extend left arm like an elephant's trunk and draw the infinity sign in front of him. Subject will switch arms after 4 -5 complete signs.

Statistical Methods

Microsoft Office Excel 2007 and Instat was used for statistical analysis. Average Values for various parameters are calculated. Effect tested using paired and unpaired't' test. Level of significance set at 5% (i.e. p <0.05)

RESULTS

Table 1: The mean value of BBS scores for group in pre and post exercises were compared. It shows that they were extremely significant with the p value <0.0001.

Pre intervention	*Post intervention*
Mean value = 30.667 ± 8.216	Mean value = 36.733 ± 7.478
P value - <0.0001 (considered extremely significant)	
t = 14.466 with 14 degrees of freedom	

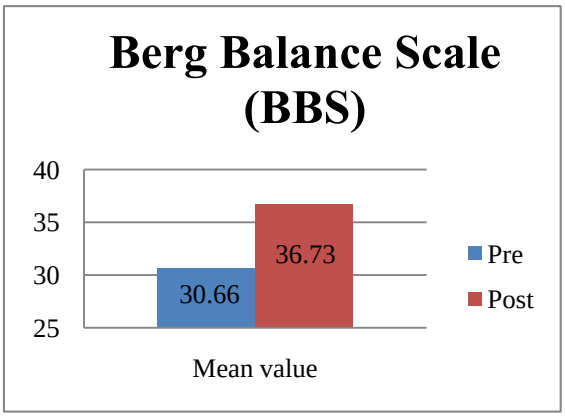

Figure 1: Comparison of BBS.

Table 2: The mean value of FES I scores for group in pre and post exercises were compared. It shows that they were significant with the p value <0.0012.

Pre intervention	*Post intervention*
Mean value = 3 ± 0.7759	Mean value= 2.267 ± 0.9612
P value - 0.0012 (considered very significant)	
t = 4.036 with 14 degrees of freedom.	

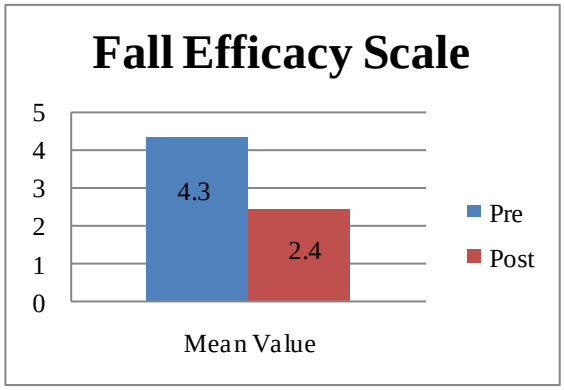

Figure 2: Comparison of fall efficacy scale.

DISCUSSION

The results obtained from our study were that Brain gym exercises improve the balance and reduce the fall risk in diabetic neuropathy. Speed of walking is significantly slower with wider stance in Diabetic individual. Diabetic peripheral neuropathy (DPN) associated with the loss of sensation is thought to contribute to impaired balance, altered gait patterns, and increased risk of falling.

Brain Gym® can Improve Reading, Spelling, math, Comprehension, Handwriting, Writing, Self Confidence, self esteem, coordination, communication, Concentration and memory, Overcoming hyperactivity and excessive daydreaming, Stress release and achievement of goals, Organizational skills, Performance skills.

Before performing Brain Gym® Exercises begin with drinking water as it activates the brain for efficient action between the brain and nervous system efficient storage and retrieval of information. [7]

Functioning bilateral movement skills and/or development properly are important for crawling, walking, seeing depth, and are a prerequisite for whole-body coordination and ease of learning in the near-visual area. The Midline Movements help integrate binocular vision, binaural hearing, and the left and right sides of the brain. Over the last century, crawling has been used in neurological patterning to maximize learning potential. [7]

Brain Gym's Midline Movements include Cross Crawl which accesses both brain hemispheres simultaneously, and stimulate expressive as well as receptive hemispheres of the brain to facilitate integration. Belly Breathing activates the Brain for ability to cranial rhythms, cross the midline, relaxation of the central nervous system. [7]

Brain Gym's Energy Exercises include Energy Exercises help to re-establish neural connections between body and brain, thus facilitates the electromagnetic energy flow throughout the body. These activities support chemical and electrical changes that occur during all mental and physical events. Neurological and physiological signals can become jammed and switch off, blocking the normal flow of brain-body communication. Energy Exercises stimulate parasympathetic function and decrease the release of adrenalin. By increasing the electrical threshold across the nerve membrane, thought and action are again coordinated. [7]

It includes exercises called brain buttons and positive points. The Brain Buttons (soft tissue under the collar bone to the left and right of the breastbone) are massaged deeply with one hand while holding the navel with the other hand. It activates the Brain for sending messages from the right brain hemisphere to the left side of the body, and vice versa, Receiving increased oxygen, stimulation of the carotid artery for increased blood supply to the brain, an increased flow of electromagnetic energy. In the exercise Positive Points the participant lightly touches the point above each eye with the fingertips of each hand. The points are on the frontal eminences, halfway between the hairline and the eyebrows. It activate the brain for accessing the frontal lobe to balance stress around specific memories, situations, people, places, and skills, relaxing the reflex to act without thinking when under stress. [6]

The Thinking Cap Activates the Brain for assisting short term working memory Aiding silent speech and thinking

skills waking up hearing mechanism so that we can hear with both ears together Remembering before/ during a test. The Elephant Whole mind & body activation Strengthens hand/eye coordination Improves attention & is very beneficial to Improves balance & equilibrium 3. Lazy Eights Strengthen eye-hand coordination Clear eye strain & sore neck & shoulders Strengthen inner eye muscles & help to focus simultaneously on the same central point while reading. The Energy Yawn Addresses skills that require use of verbal communication Provides increased energy and alertness 50% of nerves in body are related to head & face and as tension is frequently held in the jaw muscle, this is highly beneficial for relaxing & calming the nervous system to relieve stress & tension Increases sensory intake. The Energizer energizes & wakes up the system after sitting for a long time at a desk or in front of a computer Increases oxygen flow Relaxes neck & shoulder muscles Reactivates focus. [7]

In our study pre and post experimental research is done to find effect of brain gym exercises in diabetic neuropathy. So for study 15 subjects were included on the basis of inclusion and exclusion criteria. Then the berg balance scale was assessed for balance before the intervention was given. Then Fall Efficacy scale I was filled by patient for risk of fall. Fall Efficacy scale I includes questions regarding the concern about fall in individual, before the intervention was given.

Then the intervention was given thrice a week for 2 weeks, the total protocol was of 30 minutes. Then again both the scales were assessed. After the intervention the individuals improved with their score of Berg Balance Scale and Fall Efficacy Scale I.

There is documentation about correlation between Walking Tests and Psychological Factors after Brain Gym® Exercise in Diabetic Individuals, which suggests that psychological factors; cognition and depression are significantly correlated with inability to walk with different challenges in diabetic individual. Brain Gym® Exercise is effective in improving cognition and depression. Even there are other studies available regarding studies separately on diabetic neuropathy or Brain gym® exercises but there are no researches available regarding effect of Brain Gym® Exercises on balance and risk of fall therefore it is felt to research regarding this.

CONCLUSION

According to the statistical and clinical results there is significant improvement of balance and reduced risk of fall after Brain Gym® exercises in patients with diabetic neuropathy.

These exercises will be beneficial to improve balance in patients with DPN as these exercises are do not have any adverse effects, simple, cost effective and quite easy to perform.

Future scope of observation of the carryover effect of Brain Gym® Exercises in same and in other neurological conditions may offer best hope to improve neurological conditions.

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REFERENCES

1. Aafreen et.al. Correlation between Walking Tests and Psychological Factors after Brain Gym Exercise in Diabetic Individuals. IJPOT. Oct-Dec2017, Vol. 11 Issue 4, p57-62.
2. Davidson's principles & practice of medicine. Elsevier. (22nd edition 2014) p.g. no. 800, 831
3. Handsaker JC, Brown SJ, Bowling FL. et. al. Contributory factors to unsteadiness during walking up and down stairs in

patients with diabetic peripheral neuropathy. Diabetes Care. 2014 Nov;37(11):3047-53.
4. Keith J. Hyatt. Brain Gym® Building Stronger Brains or Wishful Thinking? Remedial and Special Education. 2007. 28(2);117-124.
5. Brain Gym® exercise Educational kinesiology
6. Brain Gym's Midline Movements. http://www.schleusnerchiropractic.com/fileupload/braingymactivities.pdf
7. Teresa Doğuelli. Brain Gym for Beginners. http://dunyaeducation.com/wp-content/uploads/2017/05/Brain-Gym-for-Beginners.pdf

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