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Kinesiology Training in Patients with Parkinson's Disease: Preliminary Outcomes of a Pilot Study

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ABSTRACT

Background and Objectives: Exercise and physiotherapy play an important role in the treatment of patients with Parkinson's disease. Various methods of complementary medicine exist as alternative therapies for the treatment of chronic neurodegenerative diseases in order to ameliorate disease symptoms in addition to drug treatment. One is kinesiology, which aims on effective use of physical, mental and emotional skills in humans. Objectives of this pilot study were to demonstrate the efficacy of a standardized kinesiology programme in 20 patients with Parkinson's disease on a stable drug regimen during the whole trial. **Methods**: 10 patients received over an interval of six weeks two kinesiology sessions per week. The remaining 10 patients were just followed over the same period without any kinesiology. Disease symptoms were scored and movement performance was assessed before and after this interval in both groups. **Results**: Kinesiology improved rated disease symptoms and execution of simple movement series. There was a certain tendency for a better performance of complex movements in the active kinesiology group in comparison to patients without any intervention. **Conclusion**: This pilot trial showed initial promising results on the value of a standardized kinesiology programme as adjunct, complementary therapeutic approach in patients with Parkinson's disease.

Key words: Physiotherapy, kinesiology training, Parkinson's disease

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INTRODUCTION

To date, there are numerous trials in Parkinson's disease (PD) patients on the efficacy of exercise and physiotherapy. But their interpretation is sometimes limited due to their design.[1] The same problem occurs with investigations on the different methods of complementary medicine.[2,3] One of the various alternative therapies is kinesiology, derived from the Greeks, kinesiology means the doctrine of movement. It describes an approach for the effective use of physical, mental and emotional skills. It aims on reduction of stress with concomitant increase of life energy in order to improve overall performance. One standardized kinesiology method, the so-called Brain-Gym®, was developed in the 1980s.[4] This training particularly focuses on a better interaction between the right and left brain hemisphere. It includes tasks such as reading, writing or spelling and hand-eye coordination. Certain elongation exercises serve to integrate the function of the frontal and occipital brain. Generally, it is believed that activation of the frontal lobe leads to a better stimulation of the attention intelligence. Stress reactions should be better diminished with control of blood and oxygen supply, and therefore, also ameliorate regeneration. In particular, Brain-Gym® focuses on memory, concentration, balance and fine motor skills.[4] Objective of this trial was to compare the therapeutic efficacy of kinesiology versus the normal PD course in two similar cohorts of PD patients on a stable PD drug regimen.

SUBJECTS

The active PD group consisted of 5 men and 5 women (mean age: 71.3; SD: 7.07 [years]). The PD control cohort included 4 men and 6 women (mean age: 71.8; SD: 7.97 [years]). Patients gave written informed consent. Patients who were not randomized to the active Brain-Gym® group were offered a further Brain-Gym® intervention after the completion of the trial.

METHODS

Kinesiology

The performed Brain Gym® programme consisted of certain exercises, which were performed in a strictly standardized sequence over an interval of 45 minutes. Initially, drinking of water and belly breathing was performed in sitting position. The next exercises were performed in standing position. Activation of concentration points was followed by navel massage (pages: 86, 87: [4]) and thymus knocking (page 29, 30, 31: [4]). This sequence was complemented by the activation of upper and lower limbs with crossing movements (forward, backwards, sideways) with turning on of the right left dimension (pages: 54,55,56,87: [4]); revolving of shoulders backwards, conducting movement sequences and calf pump (pages: 55, 59, 106, 107: [4]); pelvis swinging, nape rolling, eye training, thinking training and ear massage (pages: 54, 55, 56, 57, 64, 65, 66, 67, 90, 91: [4]) were the last exercises of this programme [4].

Design

Patients were randomly assigned to the Brain-Gym® group or the natural course (control) group without intervention (Figure 1). The programme lasted six weeks with two training sessions per week. All included, the participants of both cohorts finished the study. Before and after the whole Brain Gym® Training interval, the scoring of PD symptoms, the peg insertion- and tapping test were executed to assess the effects in each group. A certified specialist in neurology performed the rating with the Unified Parkinson's disease rating (UPDRS).[5] He was blinded to the results of the instrumental tests, which technicians immediately performed after the scoring procedure.

Peg insertion

We instructed subjects to transfer 25 pegs (diameter 2.5 mm, length 5 cm) from a rack into one of the 25 holes (diameter 2.8 mm) in a computer-based contact board

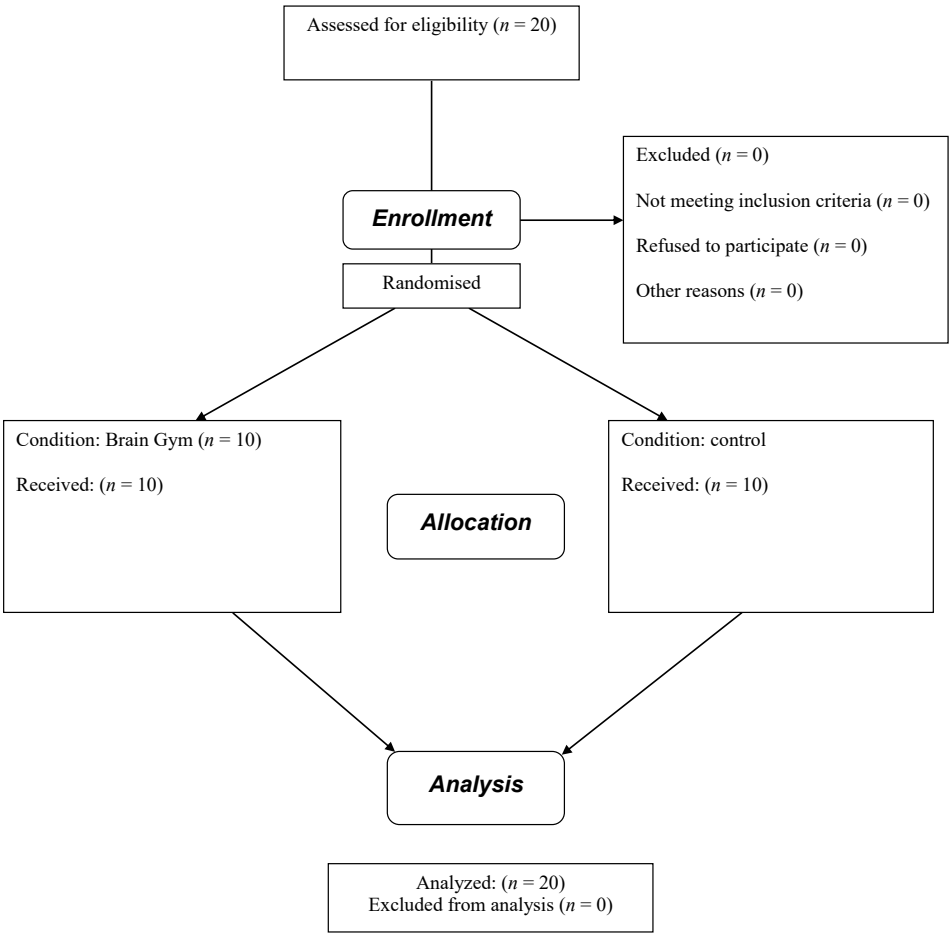

Figure 1. Flowchart of the trial

individually and as quickly as possible. The distance between rack and appropriate holes was exactly 32 cm. The board was positioned in the middle and the task was carried out on each side. When transferring each peg from rack to hole, elbows were allowed to be in contact with the table. We measured the interval between inserting of the first and the last pin initially with the right- and then the left hand. We assessed the necessary time for execution of this task by a computer with an accuracy of 100 ms.[6]

Tapping

We asked PD patients to tap as quickly as possible on a contact board (3 cm x 3 cm) with a contact pencil for a period of 32 seconds after the initial flash of a yellow stimulus light. We did not control for the peak height reached by the pencil. The board was positioned in the middle and the task was carried out on each side. When performing the task, elbows were allowed to be in contact with the table. We registered the number of contacts by means of a computerized device. First, we measured the rate of tapping with the right and then with the left hand.[6]

Statistics

Data showed a normal distribution according to the Kolmogorow-Smirnow test. Consequently, we performed parametric tests. We used the t-test for dependent samples for comparisons within each group and the t-test for independent samples for comparisons between groups. We added outcomes of both hands, in order to reduce data for the analysis of all instrumental tests. We employed the resulting peg insertion – and tapping scores for comparisons. Since this was a pilot trial with only ten subjects in each cohort with performance of two assessment qualities' (UPDRS scoring, objective evaluation of motor impairment [Tapping procedure, Peg insertion task]), we adjusted the p-value to 0.25 in this exploratory analysis. Differences between the outcomes of UPDRS, tapping and peg insertion were computed according to the formula: difference = outcome at study start – outcome at study end.

RESULTS

Figure 2 shows the observed significant decline of UPDRS scores in the Brain-Gym® group, but not in the control cohort. Figure 3 describes the significant differences of UPDRS improvements between the Brain-Gym® and the control group without performing the Brain-Gym® programme. Performance of tapping task significantly ameliorated (Figure 4); accordingly, the computed differences were also better in the Brain-Gym® group than in the control cohort (Figure 5). Peg insertion outcomes did not significantly change (Figure 6), but the analysis with computed differences revealed a better outcome in the Brain-Gym® group in comparison with the controls (Figure 7).

DISCUSSION

The results of this pilot study show that the Brain-Gym® technique exerts beneficial effects in PD patients. It improved the UPDRS score and particularly execution of fast repetitive movement sequences. Thus, one may postulate that this programme contributes to better performance of movement sequences, particularly in terms of execution velocity, and moreover, gains to counteract disturbed execution of motion sequences or activities resulting from altered PD related processing between

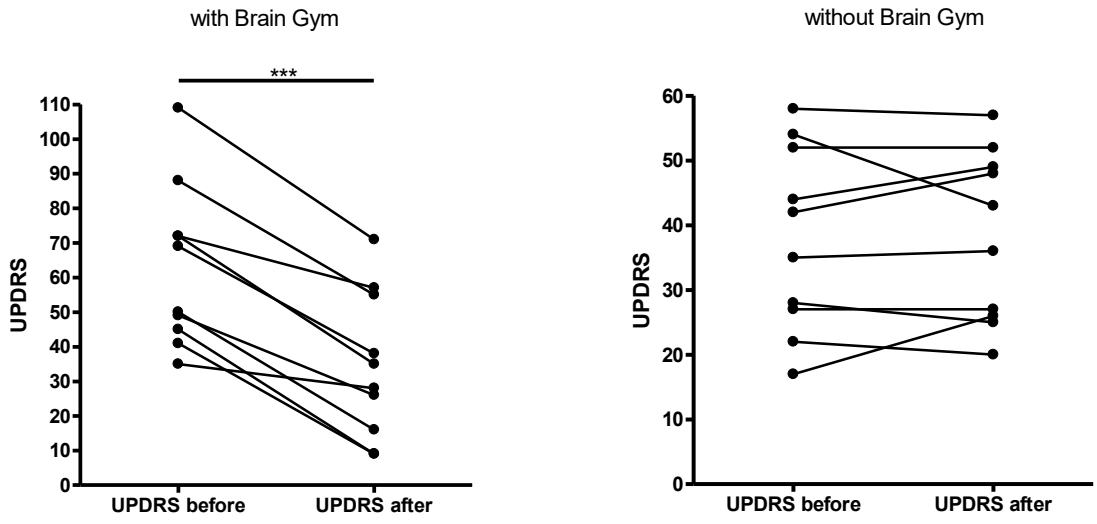

Figure 2. UPDRS scores in each group. Legend: *** = P < 0.001

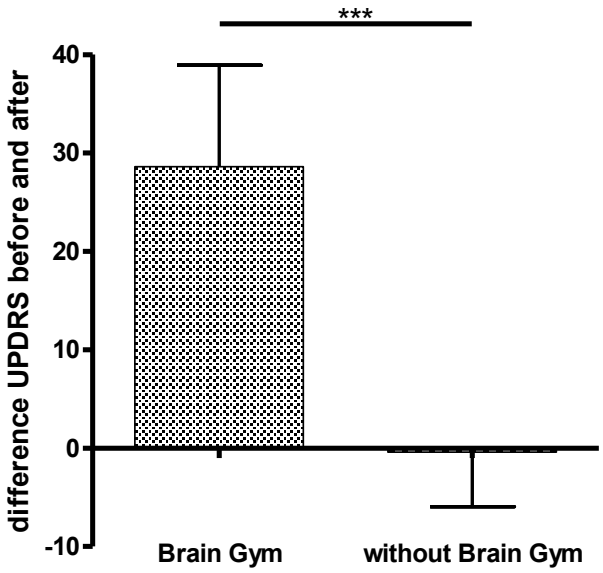

Figure 3. Comparison of the computed UPDRS differences between both groups. *** = P < 0.001

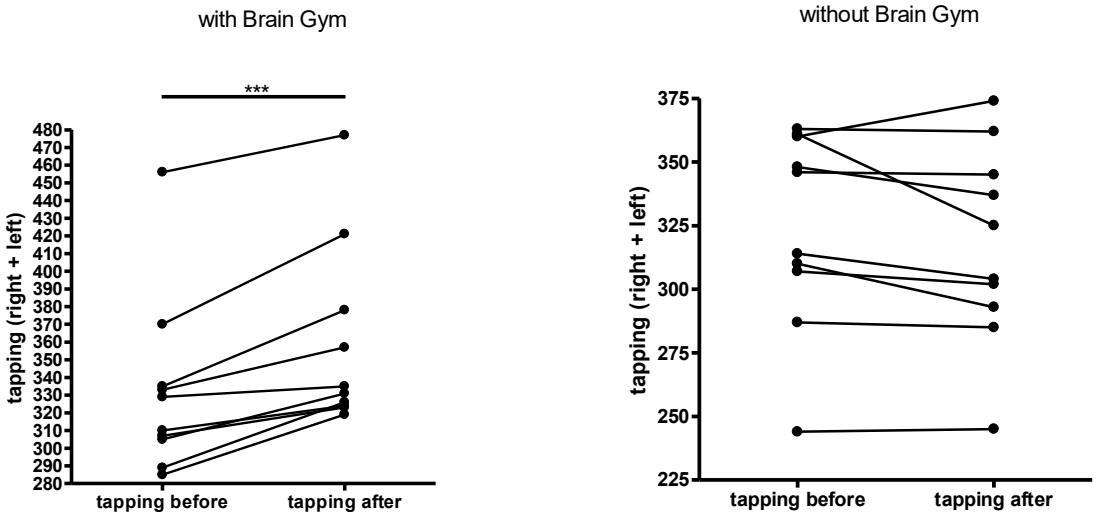

Figure 4. Tapping results in each group. *** = P < 0.001

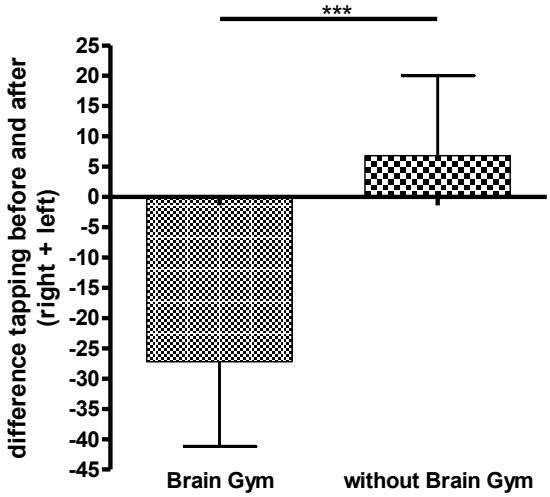

Figure 5. Comparison of the computed tapping differences between both groups. *** = P < 0.001

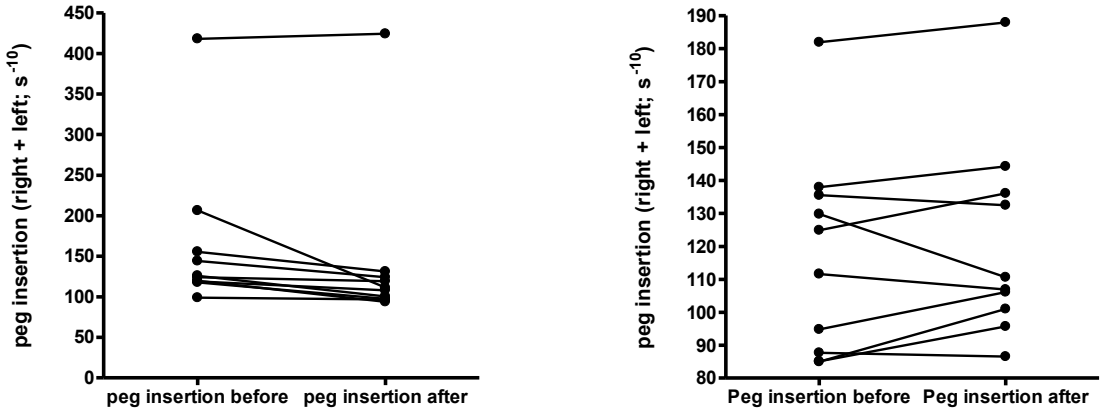

Figure 6. Peg insertion scores in each group. s = seconds

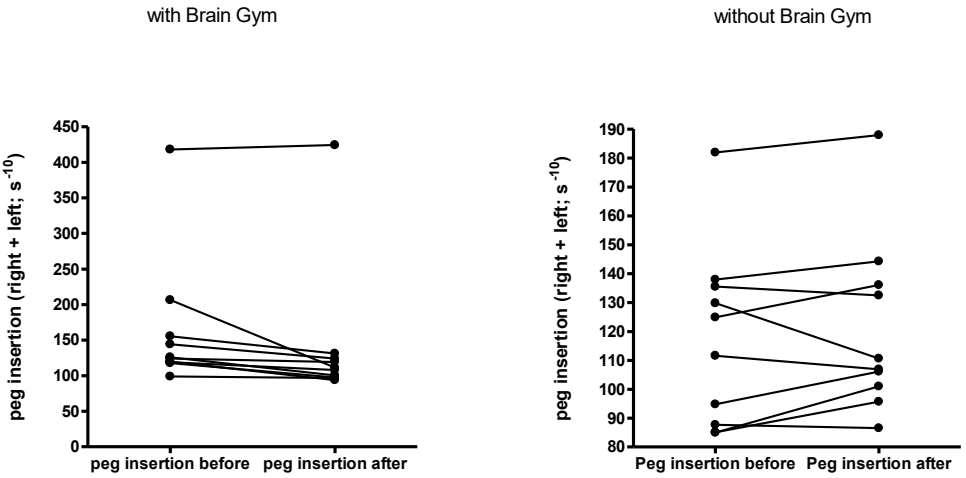

Figure 7. Comparison of the computed peg insertion differences between both groups. * = P < 0.025

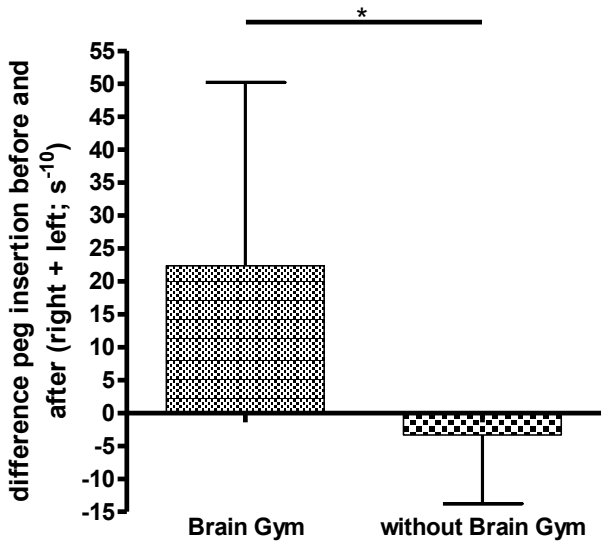

Figure 8.

motor and sensory areas.[7] This dysfunction contributes to decreased movement amplitudes at any given velocity in conjunction with the deficient speed-amplitude regulation in PD.[8] To a certain extent, our results confirm other trials, which describe better movement performance in two different groups consisting of ten PD patients each. [9] We stress that our present study only describes a certain symptomatic benefit in PD patients. This outcome does not allow any conclusions on the long term effectiveness of the Brain-Gym® programme in the treatment of PD. Limitations are the absence of a crossover design or performance of a sham session, both of which were not performed due to technical reasons.

In conclusion, we show that the Brain Gym® enhances movement performance in PD.

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